

The background of the cover is a vibrant, abstract painting in Paul Klee's style. It features a complex network of black lines, some straight and some curved, creating a sense of movement and structure. Various shapes are scattered across the canvas: a large orange spiral in the upper left, a green face-like shape with a yellow eye in the upper right, a large red shape in the center, and a blue shape with a spiral in the lower left. There are also smaller elements like a yellow square, a red circle, and several small blue and yellow shapes at the bottom. The overall composition is dynamic and layered, with a mix of primary and secondary colors.

Gendered Ways of Knowing in Science

Scope and Limitations

edited by
Stefanie Knauss, Theresa Wobbe
and Giovanna Covi

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STEFANIE KNAUSS
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GENDERED

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Introduction

Stefanie Knauss, Theresa Wobbe and Giovanna Covi

For more than a generation, scholarship on gender and/in science was predominantly dedicated to two strands of discussion. While one prominent line of research has been concerned with women's inroads into science and their careers within its system, another branch of research remains focused on the problem of how science, its content and its cultural practices are coloured by gender. Gender and science studies have principally been concerned with the study of recruitment to research and professional organisations and of science's content and cultural style. These approaches reflect both the scope of "gendered ways of knowing" and their limitations.

Its scope is indicated by studies which are concerned with questions of gendered exclusion from and inclusion in sciences, their organisation and practices. To this end, gender studies have not only been concerned with the study of the relationships between the sexes and the social and scientific creation of gender and gender roles, but also with the gendering of ways of knowing themselves: in particular when comparing methodologies and presuppositions in natural sciences and humanities, a certain way of grasping reality along the boundaries of sexual difference is noticeable. The objective, rational, apparently omniscient perspective of modern sciences is shaped by a distinctive masculine approach, which has an impact on natural sciences and humanities as well as their research cultures. The metaphors of linear scientific progress and the hermeneutical circle testify to this gendering of scientific fields, instruments and scholars.

Despite this intriguing and differentiated research, "gender" has acquired a somewhat stable and taken for granted meaning of sexual difference. "This something gender" (Barbara Duden) has become a given assumption, so that the practices of using gender are no longer reflected: using gender without observing the difference it implies at-

tributes an ontological quality to an analytical tool (Stefan Hirschauer). Since gender has a conceptual and practical history in the life of science, “gendered ways of knowing” reflect the scope of this approach while, at the same time, testifying to its limitations.

This means, among other things, that it is necessary to discuss questions such as: how and in what context are representations of masculinity and femininity produced? At what moment in the conceptual life of sciences and politics did distinctive categorisations of maleness and femaleness emerge and to what extent have they become established and how are they being used? And, how did these meanings acquire cultural relevance and become stabilised as belief systems that are now taken for granted? The point of how meaning and representation succeed in becoming structures and how they gain evidence in our understanding of social relations is central to the view of gendered ways of knowing. Against this background, the contributions to this volume are written from different perspectives with respect to both theoretical approaches and fields of research.

The first section offers different views on the term “gender”, its construction, meaning and use, raising the question of its stabilisation or destabilisation as a category of analysis. Barbara Duden opens the debate with a critical reflection from a historian’s viewpoint on the origins of the term “gender” and its uses since the beginnings of the second feminist movement, focusing on the transformations in meaning it has since undergone. Duden hypothesises that the current understanding of gender as an identity to be individually and continuously constructed, as she observes it in society at large, interacts in uncanny ways with neo-liberal agendas while contributing to a re-feminisation of burdens that goes unnoticed and unreflected.

Drawing on a sociology of knowledge approach Stefan Hirschauer focuses on social studies of sciences and gender regarding its epistemological implications. He discusses the problem in gender studies that they often do not observe their use of the sexual difference itself as a cultural practice of which they are an integral part. Against this background, he suggests to posit “social studies of sexual difference” as a specific crossing between science studies and gender studies. Deconstruction is then not simply a critical procedure of the cultural sciences, it rather belongs to the repertoires with which the cultural practice of sexual differentiation works on its own ontological aggregate state – whether in the medium of test tubes and operation rooms or in drag parties and travesty shows.

M. Cristina Amoretti and Nicla Vassallo provide a critical philosophical discussion of the notion of standpoint and its relation to gendered ways of knowing. While recognising that standpoint theory is important in its stress on the context and situatedness of knowledge, they criticise its assumptions of a prominent feminist epistemological viewpoint through which standpoint theory and the gender studies applying it contribute to a gender concept that is taken for granted. In order to avoid the problems of standpoint theory while maintaining its advantages, they propose a shift from epistemological claims to those of organisational practices, i.e. a “democratisation” of knowledge making and greater interaction between different sciences in order to achieve strong objectivity in their results.

In her contribution, Theresa Wobbe argues that it is of particular interest to investigate the very specific conditions and contexts of classificatory processes in order to distinguish the ways in which they generate schemata of sexual difference, and to explain their significance for science. Through the lens of a sociology of knowledge, she shows how statistical categories have contributed to the gendering of social fields at a distinct point in the history of both gender and science. They generate patterns of difference because their objectifying procedures gather disparate things into classes under particular headings: around 1900, social sciences added to the statistical knowing of the new concept of gainful work, which is highly contingent while resulting in differences that are still prominent for gender inequality.

The second section is concerned more particularly with scientific attempts to establish boundaries between men and women. Neurobiologist Catherine Vidal presents a critical analysis of examples of research that emphasise deterministic explanations to account for sex differences in cognition and behaviour, showing that their results are less than reliable for reasons of methodology or falsification through further studies. Reflecting on the consistent success of such deterministic views of sexual difference despite the evidence of brain plasticity, Vidal encourages ethical reflections on the social and cultural implications of neuroscientific findings on sex/gender through interdisciplinary dialogue and responsible communication of scientific results to the public.

The scientific construction of sexual difference is also the topic of Marlen Bidwell-Steiner’s contribution, which combines literary and historical methods. In an analysis of selected scientific texts from different historical periods that discuss and confirm differences between men and women she shows how in spite of changing scientific methodologies

and paradigms, knowledge about sexual difference has always been shaped by misogynistic ideas about the inferiority of women – up until contemporary neurosciences. Bidwell-Steiner proposes that a reason for this might be the attempt to maintain a given, gendered socio-political system with the help of a selective application of scientific knowledge about gender differences.

In the third section, Sandra Harding and Heidemarie Winkel broaden the scope of gendered ways of knowing by going beyond the Western realm. Philosopher Sandra Harding's contribution shows how gender and science studies have often been blind to the Western bias of their basic categories, while postcolonial science studies have not always taken account of how sciences and their results impact men and women in different ways. While the triangulation of gender, science and postcolonial studies might not be easy, their constructive interaction can be helpful to develop new strategies for facing the challenges that natural and social changes on a global scale pose today.

Heidemarie Winkel's sociological analysis of gender knowledge in the Arab-Islamic context, as it was developed in both medical and religious discourses, and of its clash with Western knowledge systems about gender relationships clearly shows how often discussions about gender presume a meaning of gendered difference and a normative concept of gender relations that is situated in the Western context without reflecting it. This prevents, as Winkel shows, the constructive study of the organisation of gender relations in other contexts, because they are read through a Western lens.

The papers collected in the last section are concerned with the organisation of sciences, research and work with respect to gender on different levels. Sociologist Annalisa Murgia's paper echoes in interesting ways Wobbe's observations about the gendered categorisation of work and employment: Murgia's empirical study of people working in research institutions with non-standard contracts shows how classical modern gendered models of work are still prominent points of reference for the construction of gender identity in contemporary society in spite of changes in the organisation of work. Alternative models are available, yet their realisation is not supported by work organisations and social discourses.

Attempts at changing cultures of work and research are made on both national and international levels. From a sociological perspective, Teresa Rees outlines the strategies – and their limitations – employed

by the European Union in order to raise the percentage of women working in academia and to mainstream gender on all levels of research and research culture, both with respect to how research is conducted and with respect to its contents. Rees underlines the importance of the integration of gendered ways of knowing not only for the benefit of the men and women concerned, but also for the quality of research itself.

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This volume brings together a number of different perspectives and ways of discussing and understanding gendered ways of knowing that challenge, question and complement each other in important ways. Theologian Stefanie Knauss's final contribution is therefore not intended as a conclusion to the volume's discussion, which we hope will continue in different ways and forms, but as an opportunity to reflect on some particularly intriguing issues brought up by the contributions.

We are grateful to the authors for their participation in this discussion and their cooperation in the publication of this volume. We would also like to thank the Fondazione Bruno Kessler in Trento (Italy) for hosting the conference "Gendered Ways of Knowing? Gender, Natural Sciences and Humanities" in December 2010 from which the articles in this volume have originated. To the Facoltà di Lettere e Filosofia and the Centro Studi Interdisciplinari di Genere, both of the University of Trento, which were also involved in the organisation of the conference, and to all the participants and speakers at the conference our thanks. Thank you also to the staff of FBK Press for their assistance in the publication process, to Sean Ryan for his editorial support and to Kris Fritz, Christina Wolff and Jakob Zwiers from Potsdam University (Germany) for their help with proofreading.

I.

VIEWS ON THIS SOMETHING “GENDER”

De-gendering Ways of Knowing: Contemporary Paradoxes from a Historian's Perspective

Barbara Duden

1. Introduction

The conference in Trento aimed at exploring the possibilities of entering into a new dialogue between science and gender studies today. The time seems ripe to do this, yet before we begin to discuss future issues it seems appropriate to look back at the past, especially at the emergence and symbolic effects of feminist social science's keyword: "gender". In my remarks, therefore, I will reflect on the transformation of the term since the beginnings of feminism in the 1970s and discuss a problematic issue that becomes visible only in retrospect: the uncanny congruence between the meaning of the term "gender" in late feminist social science and a paradox arising from the political and economic transformations we are just going through. These (neoliberal) transformations erode the importance of gender as a lens to focus social injustices while their consequences hit women in particular. The seemingly gender-neutral transformations of labour markets and the welfare state foster the ghettoisation of women workers in low-wage sectors and the feminisation of poverty, while on the other hand, due to the dismantling of the welfare state and the public sector, women must shoulder the burden by intensifying housework or doing domestic services abroad. I am asking myself: is academic feminism's central category – gender – intertwined with these transformations and a decisive cause why this scandalous development is not being publicly discussed? I am sure we should not bypass this question. Therefore, I want to investigate the role of the crucial term gender as part and parcel of the near impossibility to render visible that it is mostly women who are the target and resource of today's economic and political transformations.

I gratefully acknowledge my profound indebtedness to the conversations I had with Tove Soiland and Kirsten Vogeler on these issues.

2. 204 million pop-ups of gender in 0.06 seconds

“Social gender” was once a *terminus technicus* in academic feminist studies, where it had been coined in the 1970s as an analytic device to explore social, economic and political relations between women and men as relations of power, in past and present societies. Since the 1990s the references of the term have undergone a remarkable transformation, while it experienced an astounding career. What gender denotes is far from precise, yet its power has grown disproportionately so that now it can be associated with just anything: it is a catchphrase which today appears in EU labour market strategies, new management techniques, emancipatory visions and personal reflections, mainly of women.

When it was coined in the late sixties by feminist studies, gender was a newcomer among social categories. Its usage before had been limited to a grammatical mode or a variable in statistics. When today I type the six-letter word into Google, in a split second the net spits out 204 million references to gender. The list begins with an authoritative definition by Wikipedia: “the term *gender* names the *social or psychological gender* of a person in contrast to his or her sexual *gender*”. One cannot but be puzzled. According to this definition, gender does not name social relations, but encapsulates a universal, ahistorical property of a human being. An elusive property which anyone who believes in this kind of anthropology must ascribe to him or herself. This something – gender – lingering between the social and the psychological, I am taught, has the status of an approved scientific fact: “gender is a *terminus technicus* in the social and humanistic sciences”, Wikipedia teaches us.

The further I worked my way down the neverending list, the more it dawned on me that the term has acquired characteristics of extraordinary flexibility and adaptation: from political strategy papers or policy declarations to intimate self-perception, gender concatenates the institutional and the personal in one’s reflection. The net also directs me via a link to a company advertising “gender T-shirts” for girls. They will announce their wearers’ chest to be at once gendered and constructed: “Geschlecht ist eine soziale Konstruktion!” (i.e., gender is a social construction!). What, then, does this phantom evoke and suggest? How can we explain that it has made its appearance in millions of net references? How does it colour him or her when he or she attributes this gender to herself or her beloved? What, then, are the alchemical properties of this fall-out from academic feminism?

3. A suggestive plastic word

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It was Uwe Pörksen who drew my attention to a new class of global words which he calls “plastic words” (Pörksen 1995). These are words which had migrated from the sciences – where once they may have had a precise denotation – into popular parlance where they suggest a multitude of evocations and connotations. I am convinced that “gender” by now has all it takes to be included in Pörksen’s strange list of plastic terms. “Gender” is a word which “does” a lot of things at the same time and in one breath:

- It reinterprets social power relations between men and women as a problem of “identity”. It is in this respect that it converts social relations into a “private” problem;
- invariably the term de-thematizes women’s experiences by pushing these beyond the horizon of recognition while at the same time suggesting that it is women who are being discussed;
- the frequent usage of the term – my gender, your gender, their gender – evokes the spectre of a “gendered self” defined by academics. In stark contradiction to common sense perception this phantom – the “gendered self” – is the outcome of a constructivist interaction;
- with gender we face a keyword whose reference is grounded in a statistical scale on which human beings are both all the same and all different;
- my mother hated cooking but it was unthinkable even for her not to comply to the female duties she shared with many other women. To be a woman nowadays does not mean that moral or legal duties are imposed on her as a woman. Instead she is called to responsibly and reasonably fashion her gender characteristics;
- today gender does not refer to the common experience of injustice shared by many women but to the undesirable subordination of “gender-less” individuals under “norms” or ascriptions. Gender seems to imply a hidden command to erase the perception and articulation of experiences among women – while pointing to their common destiny to be part of a constructed, identitarian class;
- the six-letter word can serve as a catchphrase in sentences which promise more “equality” between women and men, while in the

same instance serving as a resource in neoliberal restructuring. For this reason Nancy Fraser speaks of gender's appearance in an uncanny double: an "empty signifier of the good" (Fraser 2009, p. 4).

I will not be able to substantiate all of these hunches. We need more studies on the emergence of the term and how it came to acquire its mind-shaping power. Here, I can only review crucial transformations of references to gender in feminist social science during the time span between 1970 and today. The distance I have gained by living through these decades, the curiosity that ageing affords and my involvement in feminist academe shall help to make these abstract ruminations more palatable.

4. Gender in the 1970s: a cut in the flesh

The rebellion of feminists in Europe in the 1970s was kindled by recognising that the female "body" – women's bodies – had long served as a chiffre. We set out to criticise "biology" as the then foundational truth about women. In the post-war years the dictum that female anatomy embodies women's social destiny had still been a prominent wisdom. To give an example: in the debates in the German parliament about the *Gleichheitsparagraph* – the paragraph giving equal civil rights to women as citizens – parliamentarians boldly pulled the register of women's physiological weaknesses to legitimate that after the disasters of the war the new republic would restore normalcy by bringing women back into the family and into the home. Women should again accept their nature's propensity to be wives, mothers, housewives and care-givers. The daughters of my generation politicised this "anatomical destiny". We went head on against the biologisation of women's social and domestic status. Women's bodies became the target of political fights: theoretically, politically, artistically and of course personally. I remember a French scholar who complained in the 1970s: "Can we not do the history of women without always, always, turning to their physiology?". Yet, in the 1970s it was necessary to distance ourselves from gynecology since this scientific discipline had monopolised the anthropology and philosophy of women since the 19th century (Honegger 1991).

The idea was imminent to loosen the conventionally tight nexus between social norms about women and their "biology". We contrasted two aspects: "physiological/anatomical sex" vs. "social gender". In this

intellectual move a part of women's flesh – reified as “anatomical sex” – was conceptually being severed, and this juxtaposition between “sex” and “social gender” soon gained the status of a universal, ahistorical truth. Feminist theory thus bracketed the “sexual parts” into the residual category of “primary and secondary sexual characteristics” and in this way took distance from “biology” as the conventional foundation of womankind.

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In looking back as a historian of the senses, I can now discern that this invention of “sex” objectified regions of intimate, sensual somatic apperception as scientific facts or givens. Unwittingly we swallowed medicine's definitional power over the “female” body. With naming sensual parts of ourselves “sex” we accepted the biomedical definition of women's so-called reproductive physiology. When the feminist movement set out to re-appropriate “our bodies – ourselves” in the then flourishing women's health movement, millions of women learnt to regain possession of their most intimate, inward flesh within the frame and the categories of a medical scientific model. We did not realise that this “biology” had come into being in the anatomy room, the clinic and the laboratory. While rejecting the powerful bio-bias, we simultaneously underwrote the science-bias of these “truths”. We did not realise that “biology” was the name for a new science which was capable to metamorphose social classifications into “nature's truths”. Thus, in a single gesture feminist science criticised and strengthened the scientific origin of women's bodies. This intellectual move in turn opened the space for the flourishing of social gender as a fruitful analytic term to investigate the history of social relations between men and women. Social gender was the analytic device to restore history to women – and men.

It is one task of feminist science to investigate the male bias in flourishing ideologies about women in the evolution of biomedical, microbiological and neurological sciences and to demonstrate how norms about female or male characteristics are mirrored – and misplaced – in the scientific description of cells, ova, genes or protozoa. To me something else seems urgent: to better understand the style of thinking and somatic apperception of feminist social scientists in the 1970s who epistemically cut off – externalised – parts of their own bodies. This reminds me of US-American middle-class women who felt that – when giving birth – they had to deliver their interior parts to the management of the gynecologist. Emily Martin told personal stories of this urge for disembodied self-perception in her *The Woman in the Body* (1999). The feminist efforts to “de-biologise” women in the 1970s,

20 | and to gain distance from bioscience's authoritative definition in this particular way, should be studied as a fall-out of the institutionalised, medicalised, technogene experiences of women in those years at the height of medicalisation.

5. Gender in the 1990s: from a category of social analysis to "identity"

Tove Soiland, a Swiss philosopher, pointed out the puzzling success of the single term "gender" already at the beginning of the new millenium: outside of grammar the word "gender" had become popular as an offspring from American medical-psychiatric discourse on transsexuality (Soiland 2004). It was coined by the physician John Money in 1965. Money was an endocrinologist who wanted to prove through clinical experiments that sexual identification is not anchored in sexual characteristics but comes into being through socialisation and by looking at one's own sexual parts. Money's theory was emphatically taken up by academic feminists, first in the US, then also in Germany, it seemed to prove that sexual roles are social attributions, inventions and conventions – independent of a person's "biology". Money's term "gender" strongly implied the rejection of "biology" and seemed to offer the universal cure against biological ascriptions to women.

Groundbreaking for the inflationary use of the term "gender" was Judith Butler's *Gender Trouble* (1990). In the 1990s it had become reasonable to speak of "gendered identities" – men and women. With Judith Butler's essay the idea was popularised that not only gendered identities but also the very idea of two biological sexes underlying these "identities" comes into being only as an effect of the heterosexual organization of society. *Gender Trouble* not only questioned the notion of two sexes, but the very foundation of feminism. According to Butler the subject of feminism – woman – was nothing more but an effect of those social conditions feminism criticised in these days. The concept of "woman", says Butler, should be set free into the realm of manifold significations. Gayle Rubin coined the classical phrase when she argued that we are not only oppressed as women, but we are oppressed because we have to 'be' women or men (Rubin 1975, p. 204)

Butler's interpretation of gender caught on, especially in academic gender studies. Many of these programmes made it their task to investigate the coming into being, the social production of binary gender as

an effect of ascription. The focus on the generative principles of “binary” gender further undermined the side of the social in gender which became secondary or vanished. No longer was the term a tool to investigate concrete social relations between men and women or to lay bare the power structures between them. Instead its meaning was reduced to an analysis of subordination as an epiphenomenon of the gendering of “identities”. Gender was conceived as being socially “constructed” and gender differences were sought in normative ascriptions of individuals. The basic idea behind this gender were genderless individuals becoming gendered by attributions. It was no longer social structures which created and sustained asymmetric power relations between men and women. Instead domination and subordination primarily resulted from the individual person’s performative “doing gender”, as the scholar Carol Hagemann-White explained in 1993: “While individuals act in a gendered way, they construct gender, social order and systems of domination and subordination” (Hagemann-White 1993, p. 69). This bewildering style of thought weakened or even erased the possibility to challenge subordination in a collective voice. There was no “we”, “we women” left, by which women could articulate a common experience. From now on each self-conscious feminist was called to self-critically reflect and manage her own contribution to the construction of her gender.

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Tove Soiland drew our attention to the boom in gender trainings which subsequently came up as a service to train participants – overwhelmingly women – in the art of “doing” and “undoing” gender. These gender trainings were a new type of instructional service. Here, experts teach women and men in “gender awareness” so that they become aware of their gendered social practices and learn to incorporate the opposite gender by way of trial. It is women who are the primary target of this educational exercise, which teaches them to break their habit of soft skills which might be hindering their careers: voice, body language, gestures – do they signal submission? What came into being here was the need of counselling in gender. The counselling by gender experts of course does not solve women’s problems: who will take care of my children when I am working in the supermarket? How can I practice the double obligation of thinking of my kids and toiling at the workplace? How do I organise free time for my old mother while being overburdened with teaching obligations? These counselling sessions deconstruct and untrain the attribution of heteronormativity, yet the concrete issues of women are not discussed. The belief that the asymmetries of power relations between men and women can be

abolished by gender management hides political and economic power realities. The subordination of women here is turned back on women with the challenge to optimise their individual potentials by managing their gender. The necessity of a radical change in the distribution of time, work, money and power between men and women is transformed into the personal problem of the counselee. She herself is responsible to manage her gender, and this promises to liberate her for stronger competition in the labour market (Soiland 2009).

Today, in contrast to our grandmothers, women are no longer put in their place through legitimations based on “biology”. Instead, individual women are challenged to make the best of their changes and options. This new flexible “gender regime” does not operate through disciplinary roles and norms but through liberation, by inviting each woman into the freedom of choice between variations of engendering herself. This gender regime individualises and privatises the formerly social gender into a personal property to be taken care of on one’s own responsibility – by simultaneously silencing discussions about obstacles and obligations for women in the real world (Soiland 2010).

6. Doing and undoing gender: the primacy of classification

Misunderstanding binary classifications as the source of all problems, postmodern feminist theory in the 1990 entered into an uncanny marriage with statistical classification and economic modelling. Women were epistemically erased and replaced by a figment: the responsible decision maker which is liberated to optimise her gendered profile by calculated choices.

The art to manage one’s gendered profile which I have just described in gender trainings, is based on concepts of doing and undoing gender, and this in turn grounds in the belief that gender comes into being through performative, classificatory acts. Gender as individual property was conceived as an epiphenomenon of “interactive processes”. The stuff that is being imagined to become manageable in these processes is called “difference”. It is difficult for me to make that point in another language than German because my mothertongue would allow me to speak about subtle shades of manifold “differences” which I have encountered in my historical studies: *Unterschiedenheit*, *Andersartigkeit*, *Verschiedenheit*, *Ähnlichkeit* etc. I am struggling to convey the sense of the drought which will be the result when manifold distinctions or

asymmetries are being reduced to a general “construction of difference”. Let me refer to Regine Gildemeister’s authoritative 2004 article “Doing Gender: Soziale Praktiken der Geschlechterunterscheidung”. Gildemeister, a feminist social scientist posited that individuals create sexual differences by way of action, behaviour and experience and that they do this in processes which take place unwillingly (Gildemeister 2010³). This “construction” seems to be beyond the individual’s wishes. The actor and the vis-a-vis are declared to be the outcome of a classifying process: “Each interaction is based on processes of typologising and classification. Classifications are embedded in general systems of knowing and in a multitude of institutional arrangements” (Gildemeister 2010³, p. 138, translation B.D.).

Typologising and classifying are basic tools in statistics. It is obvious that in the theory of doing gender individuals are addressed and address each other in the same manner as a statistician encodes a statistical sample. It is characteristic for the methods of statistics that factors and variables lie at the centre of all research operations. A further aspect of statistics is that by their very nature they must neglect the heterogeneity of the manifoldness of experiences of individual persons. In an analogous way doing gender neglects the inexhaustibility of experiences by summarising these as something created by the “interactions” of individuals. My student Susanna, to give an example, is taught to understand her “gendered self” as a profile of ascribed, sexualised, mostly detrimental characteristics which she is called to optimise.

What remains of the fullness, impalpability and inexhaustibility of the world and the actions and experiences of concrete people? When gender studies incorporated statistics and management into their axiomatics by taking over “construction”, “ascription” and “difference” into their mental tool kit, they accepted in the centre of their field of knowledge a method, a thought style and a terminology which erases concrete human beings and numbs their voices. I do not yet fully grasp the weight of this integration of a statistical logic into the academic attempts to look at the struggles of women – but I consider it to be of utmost importance to investigate the consequences this entanglement of management techniques, statistical thought style and feminist theory has in contemporary history. We need further studies because this entanglement is not only of theoretical interest, as today it is put into practice – politically and bureaucratically.

I am not surprised to find women in paradoxical situations when looking at the extreme epistemic reduction or erasure of human be-

ings which was a precondition for the blending of this type of feminist theory with statistics and management. Simultaneously women are being conceptually annihilated and, as we will see, mobilised as resources for economic transformations with questionable results.

7. Gender after the 1990s: the erosion and intensification of gender in policy strategies

So far I have outlined facets in the contemporary history of the reference of gender. I want to make it plausible that social gender as a tool to analyse societies has been boiled down to gender as a “private problem” and to one’s cooperation in “gendering interactions” or “doing gender”. Parallel to this shift in the feminist reference to the term, on the political and economic level almost everything by which social gender had been organised in fordist times, is in the course of being dismantled today. In political programmes we observe ways of governing which open to citizens the space of freedom to do their own gendering. This presupposes that the governing programmes are designed as gender neutral. The watchdog of gender neutrality is, among others, a concept called “equal opportunity”, which is meant to guarantee the conditions under which men and women are competing as equals on the market. The framing of economic actions is decisively genderless. This results in gender as a private, personal problem, something which in its social injustices cannot be thematised. The obsolescence of social gender as a political category together with a rhetorical gender neutrality in economic and political programmes, at the level of the EU as well as in national policies, ends up in a paradox, especially for women. A Canadian political scientist, Janine Brodie, analysed this new situation as an erosion of social gender going hand in hand with its intensification: the burdens of economic restructuring which are a consequence of these rhetorically gender neutral policies, must be shouldered overwhelmingly by women.

Let me quote from Brodie: “I argue that a critical subtext in contemporary discourse and practice has been the simultaneous erasure and recentring of women as the primary subject of welfare reform ... Although gender and social reproduction hardly play any role in neoliberalism, it is a profoundly gendered philosophy of governance that has significantly disrupted gender orders – in both the globalized North and the global South”. (Brodie 2004, pp. 20, 25, transl. B.D.).

It was at the level of supranational institutions and in international agreements that the strategy of equal opportunity or “gender equality” was first formulated and subsequently downloaded into national regulations. A higher participation of women in the labour market was the primary goal in the envisioned modernisation of global markets. The economist Brigitte Young argues that policies which at the surface seem to foster a substantial gender justice, especially in the programmes of gender equality in paid work, at a closer look reveal themselves as a strategy to open markets, deregulate labour and foster competitiveness. Let me illustrate this in one instance: a Bremen law ruled that in case a woman and a man of equal qualification apply to the same position, the woman had to be preferred. A Mr. Kalanke thus being rejected went to the EU Court and won his case. The Court argued that the Bremen law violated the principle of non-discrimination. Mr. Kalanke won, because “the Bremen law substituted the end for the means, by providing for the result of equal opportunity rather than ensuring the existence of the principle of equal opportunity” (Young 2000, p. 89). Opening markets and assuring competitiveness has primacy over creating substantial justice between men and women.

What, then, does Janine Brodie mean when she addresses the flip coin of the rhetorical erosion of gender or “gender-neutrality” which she calls the “feminisation of burdens”? The EU Commission explicitly de-legitimated the fordist rule that in principle housework and carework have priority for women. In the fordist economy housework, even though unpaid, had been valued as a contribution to the standard of living and recognised in the tax and social security system. Nowadays, social reproduction appears to be a personal or “private” problem – though it is still predominantly women who are doing it. Brodie analyses the paradoxical effects of the gender-neutral neoliberal reforms of the welfare state. In cutting down on the public expenses on welfare the state takes for granted that households will shoulder the burden of having to get along with scarcer financial means. This has a direct, yet never openly recognised, impact on women. On the one hand, the principle of the primacy of labour market participation seems to invite women to enter the competition for paid labour on equal footing with men, on the other hand, they find themselves ghettoised in low-wage, deregularised part-time jobs mainly in the service sector and it is mostly them who do the increasing care work which is declared to be a private problem. The flip side to the erosion of gender (de-gendering) in the rhetoric and modelling of political science and governance obviously consists in the

feminisation (re-gendering) of burdens for most women. The neoliberal reforms in gender neutral rhetorics – let us just name structural adjustment programmes, for instance, welfare reforms, privatisation of social reproduction, individualisation of risk – systematically de-thematise that these reforms tap on women's work, time, efforts and severely aggravate their burdens.

8. Only paradoxes on offer

What haunts me in looking back is the uncanny congruence of the emerging paradigms of feminist gender theory and contemporary economic and political transformations. Just as economic and political governance privatises the structural conflicts and disparities between men and women, feminist social science seems to have privatised and individualised social gender as gender identity – and henceforth women are made responsible for the optimal management of their gender and for the burden of their “failure”. The situation of most women today is much more complicated than in the 1970s, because they seem to be disabled to articulate their common involvement in the effects of social restructuring. It seems high time to gain distance from theoretical abstractions which dethematise women as persons while neoliberal social restructuring under the guise of gender neutrality calculates with women as those who must bear the burden of this restructuring.

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Gender Differentiation in Scientific Knowledge: Gender Studies and Sex Studies as Unwitting Siblings

Stefan Hirschauer

1. Introduction

For a long time there was silence between science and gender studies. Whereas the former appeared comparatively “gender blind” (Delamont 1987; Keller 1988), the latter, in its orientation towards a *critique* of science, was scarcely aware of the empirical data already amassed – social studies of science – nor of science’s specific epistemological problems. This mutual indifference has changed since the 1990s, especially in the way in which science studies are increasingly practiced as gender studies.

Thus, for instance, enquiries that address how science is institutionally constituted, ask how gender difference is managed in the recruitment of personnel. They examine professional biographies and obstacles to women’s advancement in research organisations, and in this way reconstruct the historical and contemporary constitution of science as “a man’s profession” (Krais 2000; Allmendinger et al. 2001; Heintz et al. 2004). Another epistemological issue concerns the content of scientific knowledge resulting from the exclusion of women from science: a question about the “gender of knowledge” (Harding 1994). How does gender difference affect the ways in which scientists think and act? Scientific knowledge falls under the general suspicion of androcentrism and this suspicion (about topics, concepts and methods) is in many cases convincingly substantiated (Martin 1987).

Both questions outlined above adopt a science studies approach which is informed by a sensitivity to gender studies issues, and both identify relevant problems that may constitute a potentially productive programme of research. Nevertheless, they share two premises that do not correspond to the state of research in gender studies, a field of

research that differs in specific ways from women's and men's studies (see Hirschauer 2003):

(1) Both questions presume ontological gender difference. They subordinate the sciences to the innumerable empirical phenomena that one observes *via* gender difference – by investigating “gendered ways of knowing” – but without observing such difference itself, as gender studies does. The potential research question, which is excluded from this premise, is how gender difference is produced within and through scientific knowledge production.

Moreover, gender difference is conceived to be a quality of persons, who become independent variables used for the purpose of explanation¹. This location of gender in persons not only assumes a questionable long-term relevance of sex membership (see Hirschauer 2001), but also neglects that gender studies have shifted the very phenomenon of gender away from persons, by showing how practices, institutions and discourses are the agents and sources of gender production. Furthermore, gender studies researchers have discovered that the gender of persons is an interesting empirical *case* of the sexualisation of every conceivable cultural object. The personalisation of gender difference, which assumes that it is a distinction characterising “human beings” and their existence, is in a deep “anthropological sleep” (Foucault 1970, p. 340) compared to the ascription of gender to multiple cultural objects².

(2) The suspicion of androcentrism (just like a bias in class, age, or skin colour) plays off the features of the scientific personnel against their knowledge, as if both were “on opposite sides” and their amalgamation a “scandal”. This opposition of gender difference and science, with its assumption of an alterity between gender and knowledge, overlooks the interdisciplinary insight of gender studies that “sexes” only exist in knowledge.

¹ For instance, the mental constitution of male and female scientists, or the interests derived from their belonging to a collective would count as “explanatory” (Harding and Hintikka 1983; Harding 1991).

² Persons have never been the only carriers of gender difference. Cultural phenomena differentiated by gender include linguistic categories, body parts, items of clothing, activities, nouns, a great number of commodities, spaces, forms of salutation, tonalities, chromosomes and other epistemic objects. A related question that is distorted by personalising gender, is how involvement in certain scientific practices may constitute, intensify or overcome, from the outset, a person's sex membership. Such a consideration of sex membership as a *dependent* variable may potentially help to clarify the range of starting points that scientific practice offers for engaging or disengaging gender difference (say, in pedagogy or engineering) (see Hirschauer and Mol 1995).

Ethnological studies (such as Rösing 1999) have thus described the sexual binary as a system of knowledge that might vary among cultures in different ways: in the gender categories used, in the classification criteria, in their significance within the life cycle, and in the ethno-biological theories on the “origin” of gender difference (Meigs 1976). Studies on the history of science, that is, on the history of our “ethno-biology” (particularly Laqueur 1992) have shown how scientific theories about sexual difference have mirrored the historical practice of gender relations, for instance in the distinction between public and domestic life. Our modern biology is an element of a specific *epistémé* (in Foucault’s sense) that binds sex to the body and to women in a distinctive way³.

Sociological studies (Garfinkel 1967; Kessler and McKenna 1978; Goffman 1977) have focused on the mundane knowledge that constitutes the two sexes before any scientific investigation: fundamental cultural premises (of dichotomy, continuity and naturalness of sex membership) on the one hand, and on the other the practical knowledge of competences and ordinary methods by which participants continuously perform their sexual affiliation.

This mundane knowledge, which is not bound into institutions, exists in multiple hybrids. Factually amalgamated, since scientific knowledge interacts with contributions from other specialised producers of knowledge: law, art, literature, journalism, cinema, etc.; temporally amalgamated, combining current knowledge with decades-old insights and freshly popularised thought in unpredictable fusions; epistemologically amalgamated, since the knowledge relevant for daily life depends on a “confusion” of descriptive and normative dimensions that direct

³ I will briefly summarise Laqueur’s central argument. His study relates the story of two radically different models of sexual difference within the body: one, valid from Antiquity to the Renaissance, was a hierarchical model of “one sex”, which assumed a mirrored similarity of the genitals, and the other, a modern model of “two sexes” that presupposed a binary contrast between the organs. In Europe, prior to the 18th century, in principle women were deemed to have the same genital organs as men, only inside, not outside the body. For a long time, women were nothing more than imperfect men, their body parts were not specific to them as women, but simply “less” than men’s. Being a sociologist of knowledge, Laqueur’s punch line was that the new anatomic model of two distinct sexes prevailed only as an “opposition discourse” to the political theories which accompanied social change at the end of the 18th century and made the bodies of men and women interesting again. With their assertion of the natural equality of all people, the doctrine of natural law in the Enlightenment undermined old justifications for the exclusion of women from full participation in political rights. Only in this situation, anatomists insisted on the fundamental difference between the sexes, which essentially consisted in the specificity of women. The “two sexes” thesis argued for their “incommensurability” against their political equality and proved a political counter-statement in the bodies of men and women.

behaviour; and finally, ontologically amalgamated, since fundamental cultural certainties exist in layered forms of knowledge: as propositional knowledge, linguistic expression; implicit suppositions, expressible, but taken for granted; as visual representations, and as know-how, i.e. body-bound practice. So there is a lot of knowledge “in” gender difference. This circumstance requires us to connect gender and science studies in a way that observes the genesis of knowledge and of the sexes together. This article aims to be an exemplary display of such a nuanced partnership of science studies and gender studies using an expression taken from Joan Scott (2001): *Social Studies of Sexual Difference*.

In this way I aim to respond to two specific problems concerning the state of the discipline of gender studies. The first problem is that examinations of scientific discourses on the one hand, and of mundane knowledge on the other, are presently undertaken in a largely separate manner⁴. Against this background, I would like to develop a perspective that integrates both, being a comprehensive sociology of knowledge of gender difference.

The second problem concerns a distinction which is particularly prevalent in current scientific knowledge: the distinction between sex and gender. Until the 1970s, the concept of “gender” designated every aspect of sexual difference which is “not” biology: personal identity, family socialisation, cultural stereotypes, speech behaviours and grammatical structures, power and love relations, economic circumstances, social inequality, etc. What held this loose heterogeneity together was the semantic opposition to a counter-concept – “sex”. This semantic opposition is no longer viable. Today it is commonly held that sex is always gender (Butler 2006; Laqueur 1992), and the subject of gender studies itself may be characterised as “sexing humans” (as already sug-

⁴ The complementary weaknesses of Garfinkel’s and Laqueur’s pioneering studies in gender studies are significant. Garfinkel blocked the question of the participation of science in gender difference with the statement that we do not believe in gender for scientific reasons but on the basis of the participation in a life form (1967, p. 122), that is, in daily practices and unquestioned “gender beliefs”. Even if this is an appropriate phenomenological correction of a rationalistic prejudice about “knowledge”, Garfinkel’s sharp opposition between daily life and science (following Alfred Schutz) overlooks both the mundane knowledge “within” science and the saturation of daily life “by” science. In the extent to which a life form is permeated by the symbolic and technical products of scientific research, we must also enquire into their participation in the evidence of the two sexes if we want to understand it. Laqueur’s study, on the other hand, has a strong empirical limitation, due to the fact that a history of the discourse restricts itself to *subsequent* interpretations of elementary distinctions between the sexes (in daily life, at birth) whose existence it never doubts. By leaving aside this question (suggested by ethnological studies) Laqueur infers a sort of nucleus of anatomical sexual difference, which is abstracted from the strong historicity of the body, which this author demonstrates.

gested by Garfinkel in 1967). This muddling of concepts creates serious problems for reflection, which the more distanced perspective of the sociology of knowledge may help to clarify. In this study I would like to illuminate the ways in which “gender studies” and “sex studies” are nested together within a cultural configuration that permanently distinguishes between two sexes. How do the natural and cultural sciences⁵ align themselves to the cultural practice of sexual differentiation? How do they use it in the production of knowledge? How do they contribute to the stabilisation or transformation of sexually differentiated life forms?

My aim is to illuminate points of contact where scientific knowledge, deriving from various disciplines, supports or transforms daily evidence of two sexes. So my perspective is not concerned with “gendered ways of knowing”, but rather with “knowledgeable ways of gendering”. Rather than offering a single detailed case analysis, I have chosen to undertake a more cursory examination of a series of cases, to create a kind of survey, which I will refine at various points by scrutinising individual instances⁶. I will not present this survey as a historical chronology, but as an analytical distinction among four functions of scientific knowledge in a cultural context. I understand these functions to be an analytical framework for a historically comparative sociology of knowledge of sexual difference. These are: the development of a cosmology of sexual difference (2); its anchoring in an ontology (3); the refinement of the methodology of sexual differentiation (4); and the development of technologies sustaining or transforming sexually differentiated bodies (5). This confrontation between sex and gender studies aims at a sharper orientation of research into sexual differentiation in the cultural sciences and at a correction of some of its misconceptions about itself, which will constitute the focus of my concluding section (6).

⁵ I use “cultural sciences” as a term encompassing the humanities as well as the social sciences. Unlike the natural sciences, which presuppose “difference” as a given, cultural sciences explore meaningful differentiations drawn historically and contextually.

⁶ I have two further qualifications to make: I will mostly examine circulating knowledge, and therefore only occasionally consider sexual difference as a local scientific practice. Moreover, I focus on cases in which science shows and maintains an interest in sexual difference, not cases in which it has lost such an interest; I therefore leave out contributions of scientific disciplines on the topic of sexual neutrality.

2. Cosmology and inclusion: how we domesticate sex

It is an old hypothesis, formulated by Émile Durkheim and Marcel Mauss (1987), that societies use the distinctions among their human members in order to classify the objects of the world. Sexual differences, too, are projected onto the world in which they are performed⁷. We find such universalising of the sexual binary in the grammatical use of gender (when nouns are arbitrarily assigned a sex)⁸; we find it in the economy, in the sexual differentiation of various kinds of commodities (think of nappies and perfumes), and also in the sexual differentiation of the heavenly personnel in whom polytheistic religions anchored sexual difference, even in the supernatural sphere. A whole sexual cosmology is produced through the inclusion of every possible cultural object in such a dual order.

Modern science has primarily subjected living creatures to the perspective of a society that distinguishes between “sexes”. The obvious self-assurance of this view was its extension to “human beings”, and thus its establishment as anthropological fact. To fulfil this aim, there were two problems to solve: the practical one of method, which was reported in numerous ethnographic studies (Devereux 1967), about how one ascribes the correct sex to natives of tribal cultures in view of the cultural specificity of local gender codes. To this was added a theoretical problem: how might one explain a third or even subsequent gender category that cannot be easily subsumed under a dual scheme. We must not present these phenomena as evidence of a plurality of gender constructions, as I myself have just done; as the history of anthropology shows, one can develop registers that assimilate such anomalies, equally well, into a dual-sex cosmology.

One practice that reduces anomalous classifications back into two “proper” categories is the export of sexual scientific diagnoses into other cultures. The North American berdache type, for instance, was considered to be a hermaphrodite in 18th century Europe and a

⁷ Durkheim and Mauss suppose that the influence of sexual difference in cosmological divisions must have been “considerable” (1987, p. 191) but explicitly bracket out the treatment of this topic. This must have been for the systematic reason that they did not consider it a “pure” social phenomenon, which it should have been in order to be included in their causal-analytical argument, in which “the social” and “knowledge” are variables facing each other. For methodological problems in Durkheim/Mauss see Coser (1988), for criticism that they reserved “socio-centrism” for “primitive” societies see Knorr Cetina (1994).

⁸ At least from the perspective of some grammarians. For a critical approach see Leiss (1994).

homosexual in the 19th century; in the 20th century, one could finally be certain that the type was “actually” transsexual (Hirschauer 1993, pp. 66 ff.). Another register is the evolutionary assimilation of the distinction between lower and higher “races” (a figure also found in Durkheim 1966, pp. 134 f.). A low sexual differentiation was ascribed to a lower “stage of development” even at the turn of the 20th century. And finally, we might have recourse to an opportunistic change of register to “culture” as an explanation for outlandish sexual categorisations outside Europe, whereas we provide biological or psychological explanations for the domestic equivalent. Using these and other explanatory models, anthropological knowledge offered a confirmation of the basic distinctions already held by a Europe whose mundane knowledge had been made insecure by its cultural contacts.

The question of whether “the alien” has to be culturally assimilated, left as it is or made even more exotic also appears in relation to other creatures. The compelling message of biological knowledge is the universal sexual division of fauna. Biology includes “human beings” in a natural world of two sexes. The sexualisation of animals (and partly of plants) creates an anthropocentric familiarity with strange creatures: the world becomes an ark, filled with cohabitants of a two-sexed world. This knowledge has a stabilising effect for the practice of sexual differentiation – human sexual difference is made familiar in a two-sexed cosmos: it is mirrored by a world, which has “always” been stamped with this difference.

There are various clues that indicate this anthropocentric disposition toward a two-sexed nature. One of them is that the sexualisation of animals obviously increases with its degree of relatedness to human beings. Our ordinary language has sexual designations for “domestic” animals, hen and cock, cat and tomcat, etc., but not for fishes and reptiles. Another clue is that the sexual ascription of natural phenomena varies historically with changes in the meaning of gender relations in an epoch (see Hausen 1976). Transformations of these relations also lead to changed descriptions of nature. Londa Schiebinger (1993) demonstrated this in the case of botany.

This historical variation indicates that the biologically differentiated dual-sex cosmology is not without its fractures. Modern biology would not be a science if it did not irritate cultural certainties with “anomalies”. Zoology today knows certain species that have one sex, others that are sexually hybrid or whose sex change is ecologically de-

terminated⁹. However, there are registers of cultural inclusion for these anomalies, too. Next to the simple encapsulation of biological specialist knowledge, there is chiefly the hierarchisation of species: the sexual division of creatures is loosened, as already mentioned, the further we move away from “human beings”. Zoological anomalies provide a profile to us and other “higher species” as sexed beings.

The occurrence of anomalies in cultural objects, which neither belong to the “lower species” nor to the “lower societies”, has always been even more problematic for the sexualised cosmos. People belonging to one’s own society are the most critical cases of the universalisation of sexual difference, since they can in principle actively participate in the production of cosmology. This sensitivity to intra-cultural anomalies gave rise to the development of complex *medical* registers of inclusion. On the one hand, numerous techniques of treatment were developed for the physical normalisation of body variation – the most elaborate ones in the case of hermaphrodites. On the other hand, a trans-disciplinary differentiation between sex concepts was developed for these very cases to support a more flexible integration of anomalies: the distinction between “sex” and “gender”. First and foremost, gender meant “sexual identity” and was an escape from a quandary arising from a theoretical problem in psychoanalysis: how does one dogmatically sustain the assumption of the fear of castration, if there are people who manifestly abandon their bodily integrity in favour of something else?

The answers to this question created a space for a category of people who, because of a disruption of their “gender identity” contest the importance of their genitals to their sex membership – much in the way that children “deny” sexual difference. The inclusion of such auxiliary theories on sex misjudgement had the merit of explaining why people may not recognise their “own” sex (Hirschauer 1993, p. 341). They opened spaces in the sex cosmology while at the same time they confirmed the ordinary methods of sex differentiation.

If we recapitulate the cases enumerated so far, it seems that scientific disciplines expand sexual difference into a world of sexual meaning: through modes of description which they universalise and

⁹ Racerunners, for instance, know only one sex, i.e., the female. Groupers and earthworms are sexually hybrid. Sunfishes have three sorts of males. Garter snakes are a case of sexual mimicry (“perfume transvestites”). Finally, butterfly fish change sex on their own initiative – this is sociologically fascinating – relatively to the proportional representation of the sexes in their environment (Crews 1987, 1994).

through theoretical explanations which ensure the inclusion of anomalies within their cosmos. Even the idea of a differentiation between sex and gender emerged with reference to the problems of inclusion and sustainability of a dual cosmology: the sex difference is widespread in the world and knows only rare exceptions that are used to re-confirm its simple existence. The margins of our sex cosmology are open to variation and disorganisation (for “gender trouble”), but its essence is universal: a sex membership should be attributed to every human being, every higher creature and every intelligible soul.

3. Ontology: the anchor in nature and fatality

Closely connected to the universalisation of sexual difference is a further contribution of scientific knowledge to the practice of sexual differentiation: its ontological anchoring in one of the two “primary frames”: nature and culture (Goffman 1974). Mary Douglas argued that a fundamental moment of stability in social constructions lies in their “naturalisation”, i.e. in a certain concealment of their character as constructions (Douglas 1986, p. 48). In the daily practice of sexual difference this is already taken very far: through a recourse to a symbolism of the body for social classification (Lindemann 1993); through the pre-reflexive sedimentation of the practice of representation in the bodies that perform it (Hirschauer 1993); through mundane theories of the “naturalness” of expression and the work division between men and women, etc. Scientific naturalisations attach themselves to this fundamental ontological understanding: when they represent a social practice as a natural phenomenon consisting in bodily substances.

The old fundamental theoretical question of biology is “where exactly” the essence of sexual difference “originally” lies. The history of biology provides various responses: in the “heat of the body” as in Galen’s system (Laqueur 1992), in the gonads, in the chromosome structure, in the cortex, in the sequences of amino acids, etc.¹⁰. In the history of knowledge, the original locus of sexual difference was shifted all over the body, in every case biology has placed the genesis of the

¹⁰ It is characteristic of the natural sciences that these localisations were carried out with invasive practices: castration was an essential knowledge instrument in the localisation of the “sexual instinct” in the gonads (Breidenstein 1996), the “sex change” of rats was an important procedure in the research of the hormonal determination of sex (Dörner 1988), and in molecular biology that has turned into techno-science, “manipulation” is not simply a technological output but the only means of the constitution of “genes” (Amann 1995).

two sexes in a substance that is outside the social. The 20th century has built up two series of derivations from this basis: an ontogenetic one, which explains behaviours with bodily “predispositions” (as argued by genetics); and a phylogenetic one, which affirms homologies between the behaviour of men and women and their evolutionary “ancestors”. This is argued in socio-biology and evolutionary psychology (see Haraway 1990).

These biological explanations of human behaviour have elicited strong oppositional discourses which derive their momentum from biology’s violations of symbolic boundaries: one concerning the barriers between species, the other that of the moment of birth; boundaries at which other disciplines have staked their claims. Since the 1950s, research on sexual difference has begun to organise itself by means of a distinction that blocked the above derivations: sex and gender. The distinction functioned first – in the treatment of hermaphrodites and transsexuals – as a disciplinary line of demarcation between somatic and psychosomatic medicine, then – for women’s studies – as a political line of demarcation between the socially contingent and the biologically given. Next to the problem of inclusion, strategic meanings were involved in the sex/gender distinction: professional claims to domains of competence and political demands for elementary rights of participation.

The emergence of gender discourse has made it seem sensible to differentiate, in two respects, Douglas’s theoretical assumption. On the one hand, as in the case of other social institutions, we have to assume a historical variability of naturalisations. Societies do not naturalise everything, at every time and in the same way¹¹. On the other hand we have to take into account other registers in the stabilisation of cultural constructions, which in the process of weakening or reinforcing reifications, change the ontological aggregate states of cultural objects.

If we employ this hypothesis to consider the usage of the “gender” category, it seems to indicate a “radical departure” from naturalistic conceptions of sexual difference. It does not thematise the morphology and physiology of the body, but the psychic and social phenomena: power relations, roles, stereotypes and identities, which may vary independently from the individual anatomy. Gender is an antithetical concept which brackets out certain questions of the “opposition” (particularly those

¹¹ This is one of the fundamental insights of historical studies on sexual difference (Hausen 1976; Laqueur 1992; Honegger 1991; Frevert 1995): with the emergence of bourgeois society, sex was more naturalised than at any previous time. In this regard, gender studies describe a “step backwards” in the history of knowledge, as sex was again conceived of as a social category.

concerning the configuration of the body) in order to turn to others: language, work, relationships and inequality in the life of “the sexes”.

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Well, yes, of “the sexes”. In the 1990s many voices raised doubts as to whether the line of demarcation holds. The distinction between sex and gender increasingly turned out to be an unequal division of labour of the disciplines presupposing that biology and medicine remained responsible for the “foundation” of gender difference. This is shown by the fact that as a rule, precisely *with* the opposition to biology, essential premises of a naturalistic conception of gender difference are preserved: the binarism, the individualism and the fatality of the two sexes.

In the cultural sciences, the assumption of sexual binarism is in part theoretically explicit but more often very casually reproduced: through the routine examination of sex as an independent variable in pedagogy, linguistics, psychology and empirical social research. This variable has special advantages in matters of investigation technique. In this case, the total investigation of data in a sample, which we usually aim at but repeatedly miss because of incompleteness, succeeds without any problem. Further, unlike the cases of income, age or personality traits, the building of categories on this dimension does not have to be done by science. The specific naturalism of the use of sex as a binary variable consists in the fact that it can be handled without having recourse to decisions. This is an attractive factor that in these disciplines could be replaced only at great expense.

This binarism in data acquisition allows us “to compare the sexes” – a practice belonging to the culturally elementary uses of sexual difference. We also find it in children, teachers, parents, etc. It relies on making sense of social categories by finding empirical differences between the entities categorically distinguished beforehand. Finding a “difference” confirms the presupposed distinction by giving it meaning, retroactively. When we produce meaning on this basis, we are bound to find every sort of distribution phenomena in ‘all’ disciplines: not only concentrations of hormones, growth, life expectancy and fat tissue but also social prestige, empathy, pauses in speech and prices for haircuts. The finding of sex differences becomes the programme of an observation *with* this difference – whether in sex research of natural sciences or in gender research of cultural sciences.

Next to this binarism, many approaches in gender studies have preserved the individualism of sex. Even if we understand sexual difference as a social phenomenon, it is always localised in or onto individuals:

in biography, social character and socialisation, i.e. in the periphery of the social – in the production of “ready-made” participants in societies. Classical psychoanalysis provided the related model. In its assumption of a “gender identity”, it took over the biological premise of an early sexual determination. This assumption reifies the distinction between the two sexes in such a manner that it can function as a substitute for its naturalness: once made, men and women are “there” and it lies in their psychic nature to be what they have become (Sternman-Achempong 1996). The alternative thus offered to the biological naturalisation of sexual difference is its turn into biographic fatality.

It is interesting to note that even those approaches to the cultural sciences that conceive of gender explicitly as de-centred in relation to the individual do keep a part of this bondage to fatality – in this context I focus on gender studies in the narrower sense referred to above. In an attempt to explain the great stability of this gender distinction, they sketch out hermetically sealed systems from which there seems to be no way out except by “subversion”. What, for psychoanalysis, had been precarious but unshakably constant in the early stages of life, has become socially contingent but omnirelevant for ethnomethodology (West and Zimmerman 1987), and a performative effect for post-structuralism (Butler 2006) embedded in a system of oppositions functioning like a total institution that permeates every gesture and every word – like the genetic code of every cell.

The attempts of cultural sciences to make an ontological shift in sexual difference are, therefore, aiming at a new primary framing, but in the determination of what “gender” actually means, they seem to have a foot in a naturalistic ontology. On this basis, the types of knowledge in both the natural and cultural sciences are registers to which we can have recourse in daily life as we need them. An example of such a switch in registers is the option of homosexuals to have recourse to biographic fatality or the “homosexual gene” when they reject therapeutic interventions in their lifestyle. Another example is the parental interpretation of their children’s behaviour: as long as it is all about distinguishing their own children from the “wayward” ones, theories of socialisation offer a wealth of useful meaning, but genetic theories have undoubtedly more to offer when the point is to explain consistent bad behaviour of one’s own child. Such changes of register belong to the privileges of a pragmatically required opportunism of daily life.

In the examination of the scientific ontologies of sexual difference we notice that the nature/culture distinction is not only used in

sciences, but also in everyday culture in a very flexible way. Here, we might ask the reflexive question: what is the place of our own cultural analysis, since we are examining scientific knowledge from within the sciences. In this approach, we are using intellectual tools of certain disciplines: we have started from a perspective that places sexual difference primarily in practice. Further (even if casually), we have used the support of a section of knowledge belonging to the anthropology and history of culture, which could itself be analysed as an exoticising register within a deconstructive register of sexual difference. But since we are busy working *on* such a register, we will not hurry to make our analysis symmetrical, but try to tap the full potential of what a cultural perspective has to offer. We do not want to demonstrate just its potential for reflection and let it vanish into reflexivity but continue to use it to dissolve the substantiations of social life, including the elaborate reifications of other disciplines.

4. Methodology: monopolising the procedures for sex identification

Let us, therefore, consider a third contribution of sex and gender research to the cultural knowledge of sexual difference. It concerns the problem of the practical accomplishment of this distinction, i.e. of the classification of methods. Most disciplines undoubtedly have first recourse to the mundane method of sexual attribution (as explained by ethnomethodology): we orient ourselves by external appearance and performance or (in telephone interviews) by voice. This is valid for almost all cultural sciences referred to and also for many natural sciences, when persons whose blood types are investigated are first classified with the same procedures as the male and female colleagues working in the lab.

Next to the mundane method we still find various unusual methods of sex identification, locally restricted special procedures like chromosome and hormone analyses, genetic and psychological tests, or methods of prenatal sexual diagnostics¹². These are secondary procedures insofar as they necessarily have to build on the mundane method. In order to determine that men have this testosterone value and that chromosome

¹² Such extraordinary procedures for sexual determination exist not only in scientific disciplines but also in judicial practice. The most prominent example is the “sexual oath” by which hermaphrodites, up to the beginning of the 20th century, could commit themselves to a sex in both speech and garment and thus have the last word in the face of medical diagnosis (see Hirschauer 1993, pp. 69 ff.).

structure, and women these values and those chromosomes, men and women must first be differentiated. Without it, procedures cannot be attached to the language game using the categories “man” and “woman”. However, in individual cases they can come to anomalous results. Let us have a look at a few examples of methods.

Zoology has to solve the specific problem that its procedures of determining the sex of animals cannot lean on the mundane method used for human beings; in principle, taking part in the sexual coding of some species is out of the question if, say, it consists in olfactory signal systems: when the animal’s “gender” is not communicated visually but through the nose. In this case, too, secondary procedures are developed, surgical methods of sex determination, for instance, in order to compensate for the limits of participation in the sexual communication within the species (see Birdwhistell 1970).

By contrast, psychological tests attach themselves explicitly to the communication stereotypes within the species. Cultural codes of “masculine” and “feminine” personality attributes, the way we find them concentrated in the mass media are not simply criticised, but used in such a way that artificial categories of persons may be produced, corresponding to their mixed occurrence in individuals: feminine, masculine, androgynous and undetermined. The stereotypes are thus reified to sexual criteria in order to present “surprising” mixtures and new sexual categories. The more consistently personality attributes are sexed, the more anomalous cases, falling “in-between” the sexes, can be “discovered”¹³.

Such discoveries follow a research interest in which the exigencies of a sexual membership suitable for daily life and obligatory for everyone are initially indifferent. But in individual cases experts can still derive authoritative decisions concerning the legitimate sexual membership of an examined person from this indifference. It comes down to a competition of methods of sexual identification when the subject and object of a sex classification have recourse to different procedures.

¹³ We can find for instance that “androgynes [order] information less on its gender relevant content” (Alfermann 1995, p. 40) i.e. that cognitively, they function differently from the research personnel. Certainly, we can use this perspective to examine not only characteristics of body and personality but also forms of conduct (speech styles, leadership behaviour, ways of writing), similar to the feminist social research on difference. In an analysis that has not yet been surpassed, the sexual scientist Hans Magnus Hirschfeld demonstrated what happens when, in a second step, one tries to reify these to sexual characteristics: it results in a true explosion of sex categories (Hirschfeld 1918).

A telling case is prenatal sex diagnostic. For the (provisional) basic equipment of a person with sex membership there is a traditional mundane knowledge of sex prognosis. It consists in a speculative combination of “exterior clues” – such as the form of the belly, the state of the skin or the “cravings” of the pregnant woman. Today we would not set much store by such quaint procedures as those evidenced in 17th century France: for instance, to see which child’s clothing floats longer on water, or to take the pregnant woman on your lap to see which of her feet hangs lower (Gelis 1989, pp. 146 ff.). But even today the haptic and intuitive knowledge of pregnant women, which they gain by their intra-corporeal communication with the unborn, is important for them (Rothman 1993) – a type of knowledge which Barbara Duden drew attention to (1987, 2002).

These mundane methods are now confronted by techniques of pregnancy diagnosis suitable for sexual prognosis, mostly ultrasound examination, but also amniocentesis and genetic tests. In the matter of first sex ascription to the newest members of society, the traditional “guessing game”, which provides an occasion for multiple “gambling” and is carried by a knowledge that admits that “one cannot really know”, is confronted by a scientific knowledge which insistently claims a decision as to whether one wants to have it or not. The sex of the child can now be taken, early on, into the domain of positive knowledge, but taken out again in the sense of a “re-enchantment”. Pregnant women have to decide: either definitely knowing the child’s sex, or leaving it in a space of intentional not-knowing, of hopeful intuition and fantasy up to the time of birth.

In a current research project we can observe in the gynaecological practice how the option not to know the sex of the child “definitely” is co-determined by the doctor’s individual handling of ultrasound: from “divulging” a strict sex statement to feigned ignorance or collaborative keeping of the secret. Often the medical information politics stimulates the parental will to know because the option of the “re-enchantment” of the child’s sex must be sustained in the face of the expert who “always knows better”.

A second effect of the competition in methods of identification is the increase of demands for the “true” sex. This becomes very obvious in the case of a sex change, when persons affirm their subjective sense as the only legitimate space of knowledge and enforce this over and against lab data. They can count on the ambivalent support of psycho-

analytical methods of gender attribution for which the self-knowledge of the subject is central; as description of symptoms, it is however under the suspicion of self-deceit and is therefore thoroughly checked.

The case is different in sports medicine, where in a field determined by massive sex segregation, the sexual mobility of persons is under surveillance. Sports competitions specific to the sexes demand a clear-cut man-woman distinction produced through urine tests and chromatin analysis. Participants' knowledge is involved when they deceive by using anabolics. But in the case of an unusual organisation of chromosomes, the athlete accused by sports medicine of being of another sex is often explicitly ignorant, unless he or she is familiar with the following cultural practice¹⁴: one takes a swab of the oral mucosa or pulls out a hair to isolate the root. These objects are fixed in 70% alcohol for at least two minutes and then coloured with a red dye (made of phosphotungstic acid). After colouration they are rinsed in alcohol once more, coloured green at a temperature of 22 degrees and finally rinsed again. The objects are then examined under the microscope in order to find a red structure against a green background. This structure is called chromatin particles and it can ultimately decide a sex membership.

In a remarkable contrast to the establishment of subcultural lifestyles, which claim that knowledge of one's own sex is an exclusively subjective experience of the self, such lab procedures are just as exclusively kept in the hands of experts. In both cases, the phenomenon of "sex" is defined through a social form of sharply unequal distribution of knowledge: it is something that a speaker can say about another without the other knowing anything about it or it is just something that only a subject can know about him/herself and the others can change it just as little as a firmly held religious conviction. In 'both' cases, it is the sharply unequal distribution of knowledge which constitutes the facticity of "sex" and "gender", whether in the sense that it can be imposed as an "objective" criterion of exclusion in a sport event, or as a "subjective" ultimate formula of justification for a lifestyle¹⁵.

¹⁴ The following presentation is a greatly simplified and abridged version of the normal procedure of chromosome analysis practiced from the 1960s to 2000 (Jørgensen and Eberle 1972, pp. 86 ff.).

¹⁵ In saying this I imply the hypothesis that biological procedures of sex identification in the hands of non-specialists (such as "domesticated" genetic tests) would constitute a less stable "sex".

The paradigmatic case for this hardening in sex ascriptions is naturally birth. The concept of ascription in sociology always stresses that (by contrast to careers), nobody has to *achieve* anything for such a status; but more importantly it seems to me, you do not even need to know it. It is obvious how this can stabilise the classification of persons. When two parties can know something equally, the possibility of negotiation is always implicit. If only parents, obstetricians or lab technicians can know, or if only one subject who experiences him or herself exclusively should “ultimately” know, then, sexual membership – whether called “sex” or “gender” – is a hard social fact. Reconstructed from the perspective of the sociology of knowledge, this aggregate state of sex membership consists in both cases in the fact that the methods of sex ascription become socially exclusive and inaccessible.

5. Technologies: material interventions in sexual differentiation

The contributions of scientific disciplines to the practice of sexual differentiation, which we have considered so far, are to a large extent based on practices of symbol usage: naming, describing, explaining. Alongside them, the natural sciences mostly depend on invasive practices of body modification. Various medical disciplines extend this technical transformation and material production of the body beyond the walls of the lab.

This reliance on technology is not radically new since it is attached to older cultural technologies of gender presentation – the disciplines of attractivity which polarise bodies aesthetically: diet plans and weight-watching, bodybuilding, hair styling, fitness, skin treatments and tanning. The physical structure of the body is always subjected to social change, it is like a sculpture, a hybrid artefact within which society inscribes itself. Medical disciplines contribute to this aesthetic polarisation in sexual difference: they continue in the body what fashion begins on it. The best-known scientific and technological procedures that follow are those of plastic surgery: breast implants, penis enlargement, potency prostheses, hair transplants and face lifting are medical technologies, which aesthetically sustain sexually differentiated bodies.

The medical use of “sex hormones” also has such polarising effects: oestrogen is used against the de-feminisation of the menopause or for the feminisation of virile women. However, it can also have levelling effects on the fertility and body form of men – as “undesirable secondary effects” due to the oestrogen treatment of pigs and cows.

Medical technologies thus allow interventions in the “body gap” between sexual categories. They also allow a new form of sex assignation. Such a case is the sex-determination of unborn children. As in the choice of sex partners we are dealing with a practiced sexual preference here. The social interest in this is not a new phenomenon. Since Antiquity it has produced a corresponding technical skill, particularly because of the higher appreciation of male descendants (Williamson 1976)¹⁶. Traditional “recipes” of procreating boys and girls included various possibilities of influencing the sex: diet, ritual, magical and also certain sexual practices¹⁷.

Rudiments of this knowledge are even found today and transmitted in new ways: aside from family communication there are parenting journals and books with names such as *Wunschkind Diät* [The Designer Baby Diet] (Feichtinger and Reiger 1991). Old practices are mainly built on new medical knowledge foundations. One can rationalise the old recipes at the time of conception with the different rhythms and life expectancies of sperm containing male or female chromosomes (Shettles and Rorvik 1987). Most of all, the mundane practices of conception can be completely replaced by the clinical procedures of sex selection of embryo cells – trials of sperm division have been made since the 1930s. Many American clinics have discovered a lovely new pathology for these procedures: so-called “sexually imbalanced families”.

In Western societies the cultural background of this pathologisation is less the old preference for boys, since this has been on the decline after the second wave of the feminist movement (Williamson 1976; Arnold and Kuo 1984). A preference for offspring of both sexes emerged in its place¹⁸. The reason may be a cultural discourse of representation

¹⁶ In the case of high birth rates, the simplest method to influence the proportion between the sexes is the trial and error procedure of birth control. An early study in the USA that monitored the sexual distribution of last-born children (Winston 1932) shows the effect of this method: significantly more parents ceased producing children after the birth of a son.

¹⁷ A few examples: in Styria one buried the afterbirth under a pear tree if the next child was going to be a girl; in Slovakia, a boy was made to roll in the matrimonial bed before the wedding night and a boy's hat was sewn in the wedding dress (Hovorka and Kronfeld 1909, pp. 528 ff.). Such prescriptions often have an ambiguous cultural “burden”. In some regions of the Alps and also in the Jewish tradition, it is believed that boys are born only when the woman has an orgasm before the man (Westheimer and Mark 1996, p. 12). This may at first sound like a fairy tale to enhance the quality of male lovers, but it does embrace a belief traceable back to Galen's ancient tradition about the importance of sexual excitement for conception and about the greater “heat” of the male sex (Laqueur 1992).

¹⁸ Demographic statistics taken for the whole of the 20th century have found that parents of two children of the same sex are more strongly inclined to have a third one than parents

about the ideal proportion between the sexes in a family. While the sex distribution in public and professional life is consciously managed through “quotas”, commercials and soap operas rather casually feed the expectations of parents that the combination of their sexes will be replicated by their offspring: in most cases the preference for children of a certain sex becomes virulent with the second child (Adelmann and Rosenzweig 1978).

In other cultural contexts, the continuing strong preference for boys provokes the combination of new sexual diagnostics with the archaic methods of sexual selection: child murder and abortion. In some Asian countries (particularly India) this leads to alarming changes in the sexual composition of populations¹⁹. In the case of sex determination the cultural practice of sexual differentiation is highly affected by medical technologies.

In a different way, the same is true for other procedures of reproductive medicine that allow women consumers to realise in their bodies a highly valued sense of being a woman. What plastic surgery does aesthetically, reproductive medicine supports functionally: it maintains sexually differentiated bodies. In spite of this basic “conservative” function, these procedures are bound to lead to a few radical innovations, such as the de-coupling of biological and social parenting. Moreover, they change the personnel of reproduction. The cultural supremacy of the notion of “two-sexed reproduction” strongly depends on the stylisation of the sexual act in the context of pair relations of different sex: a practice that consists of pairs uniting the two sexes. By contrast,

who have two children of different sex. This effect became stronger in the 1960s with improved contraceptive methods, but has gone down since the mid-1980s, as a generation of parents plans their families within a comparatively egalitarian horizon of values (Pollard and Morgan 2002).

¹⁹ The Indian government put prenatal sexual diagnostic under interdiction in 1994, the Chinese followed suit in 1995. Even in 1973 Amitai Etzioni speculated about the social consequences of the strongly imbalanced sexual distribution in the US: “There would be a growing proportion of the population unable to find marriageable partners; homosexuality and prostitution would probably increase. Furthermore, since there would be fewer women, there would be fewer persons interested in culture (books, theatre, art) or charged with the moral upbringing of children ...; and there would be more people engaged in competitive, materialistic pursuits ... For the same reason, violent crimes would rise” (Etzioni 1973, p. 16), in short: “a society with some of the rougher features of a frontier town” (*ibid.*, p. 230). Etzioni’s worried extrapolation of “gender characters” in the future makes clear on what basis the need to control sexual determination depends: on whether sexual differentiation is handled in a socially meaningful way. Barbara Katz Rothman (1993) draws our attention to a feedback effect that might occur in this respect: whereas children with “disappointing” anatomy might correct parental sexual stereotypes, the children of the right sex can be adapted to them: “When we choose our sons as sons and our daughters as daughters we will exclusively see them as bound to their sex”.

the number of people involved in reproductive medicine has steadily increased: through experts, gamete donors, surrogate mothers. One's biologically "own" children are socially conceived by an ever-growing number of extraneous personnel. Moreover, the sexual quality of the original fertile unit is changing: in a medical view, the pair as a whole is considered a quasi-hermaphroditic patient, which leads to the situation that the infertility of the male body is extensively treated on the female (Van der Ploeg 1995).

It seems crucial to me that the efficiency of reproductive medicine depends not only theoretically, but also practically on the reduction of sexual difference to a difference of substances, which are separated from their producers and optimised in quality. For reproductive medicine the primary carriers of sex are not persons but lab substances. Their producers can be named using a quasi "sexually neutral sex category": they are "gamete donors". That is the offer of meaning that reproductive medicine makes to us: to be producers of reproductive materials like a blood or organ donor, without any attachment to personal identity.

6. Cultural and technological deconstruction

My initial interest was to find out how the sciences use sexual difference to produce knowledge and how they co-produce sexual differentiation by means of their knowledge production. What insights could be attained by social studies of sexual difference, which, in their examination of scientific knowledge, would not ignore the knowledge contained *within* sexual differentiation?

Even a cursory survey such as the one in this article shows that scientific knowledge is nested in multiple ways within the cultural practice of sexual differentiation. On the one hand, the scientific production of sexual difference is caught up in, and biased by, the essential cultural assumptions of daily knowledge; in its methods and enquiries, it has continuous and inevitable recourse to it: when it disassociates itself "critically" from its stereotypes or when it methodically enhances and varies them, when it differentiates between sexes and then "finds" differences between them, etc. Conversely, it feeds mundane knowledge with its cosmological and ontological repertoires, which are further developed by anomalies.

On the other hand, it must also deliver numerous new theorems, methods and technologies: symbolic auxiliary constructs for the as-

simulation of anomalies, secondary procedures of sexual differentiation, additional sex categories and physical repairs in view of body norms, which could not even be sustained without them. These productions function as services to certain institutional arrangements within the social reproduction of the binary division of the sexes: as gatekeeper for sexual segregation in sports, as diagnostic assistance to decision-making concerning the recognisability of sex membership in daily life, as technical support of body functions in the social organisation of pair relations, or as aids to meaning in the sense-making process of parents, teachers and identity seekers. Thus scientific knowledge becomes a cause of irritation and transformation of mundane knowledge, a strong participant in contemporary life-forms by creating new sexual categories, for instance, “sperm donor”, “intersex”, “surrogate mother”.

In the consideration of the ontological framing provided by the categories of “sex” and “gender”, we have seen that there are strong elements of continuity with naturalistic elements in “gender” discourse. Conversely, we must now observe that the scientific technologisation of sexual difference includes elements of “gender”. Technical body changes of stubbornly “identified” owners (for instance women suffering from their inability to have children) or the selection of foetuses according to traditional dowry rules (as in India) show that “sex” must not be harder or more unchanging than “gender”. Moreover, neither should the thematisation of contingency and construction be a privilege of the cultural sciences. Hormone treatment, plastic surgery and sexual determination of foetuses are for their own part cultural forms in which the social construction of the sexes becomes aware of itself. The discourses of gender studies may express this constructivity conceptually, but technical procedures make it spectacularly visible in contemporary societies.

Also, with regard to the deconstruction of sexual difference, it seems that sex and gender studies would only bring out the opposing registers: to the public, one comes over as an irritating academic language game, the other as technological shock. The irritation arises out of a conceptual disassociation from the daily language game of sexual differentiation, the shock from a “cultural lag” in which new scientific knowledge clashes ever faster with its epistemological precursor stored in the lifeworld²⁰. The rhetorical form of the registers is also different

²⁰ This is a well-known phenomenon in cultural sciences. In sociology, one can assume that one will soon meet again with successful concepts like “sexual role” or “socialisation” as informants’ conceptual supports for making sense of the lifeworld, i.e. as participants’ notions (Goffman 1977, p. 304).

and may explain why their cultural power of persuasion is so unevenly distributed. Whereas gender discourse appears to be a “critique” of mundane knowledge and compares “the actual” pathetically with future possibilities, the technologisation of sexual difference appears both refined and modest as a gain in options, opening new possibilities for individual users: whether they want boys or girls, interruption or enhancement of fertility, hormonal polarisation or levelling, “sex-change” or penis enlargement.

On the one hand, what the sciences describe as the organic foundation of sexual difference is increasingly co-designed by social processes: repair surgery, individual decisions, cultural norms and political control. The organic sexual binary is increasingly dependent on its social reproduction. On the other hand, the social contingency of sexual difference finds its strongest cultural expression in technical interventions in the body.

Behind this irritating finding stands that powerful transformation in the history of the body described by Thomas Laqueur. Let us take a new look at his study. Next to the political upheavals of the Enlightenment, our two-sex model profited from the collapse of that metaphysical worldview that conceived of the body as a microcosm of a whole order of creation within which every bit of nature had its significant place. This body was not seen as determining but as illustrative of the social order. Thus in societies in which public life was predominantly determined by men, bodies only illustrated what everybody already knew: that men are the measure of all things. At the same time, various other demands had been put on these bodies over the centuries: monks and knights, clergy and laity, infertile women and prostitutes could interpret the one-sexed body in the way they needed to in order to understand and relate to it. In modernity, this body, which emblematically embodied the world, was displaced by the idea that it was solely an object of positive knowledge, which embodies only itself and is clearly delimited from the rest of the world as a vehicle of our biological existence²¹.

²¹ Laqueur’s interpretation of this contrast between rigid social relations and highly flexible bodies seems anachronistic to me: the “one-sexed” body of ancient Greece was similar to our “gender”, whereas social relations, by contrast, were as fixed as our “sex” (1992, p. 8). Instead of this lopsided analogy it seems to me more reasonable to assume a relationship of functional equivalence of discourses, technologies and institutions: in a secure patriarchal order, in which women were excluded from men’s privileges as a matter of course, they were allowed to participate in a *body* that was human and male. They had in principle no equal rights, but at least in theory the same body. Only when women claimed participation in the *political* sphere, were they excluded from the general body and declared bodily specific. Political rights and body

Laqueur's conclusion that the social availability and interpretability of the body has diminished with modernity can be understood sociologically to mean that the interpretation of the body has increasingly become the privilege of certain professional groups that can stake claims on it. Social differentiation has made the body more impermeable to cultural claims from other domains of practice. Once this modern body has lost so much interpretative flexibility for the cultural demands of the day, the only remedy is increasing material flexibility. The body has become increasingly available for the individual "user's" design demands exactly because it has been divested of its interpretability. To put it differently: to the extent that the body was made unequivocal and reified by science, the contingency of its cultural interpretability can be represented only through its technical modification.

On the basis of the deep indifference to the diverse design demands of individual "body users" which we have just delineated, sex studies do, ironically, seem better adapted to contemporary circumstance in which sex has become an object of selective decisions in many respects: what kind of sex partners does one choose when the choice of partners is deregulated? What style of self-representation does one choose when conventions, whether due to fashion or expression of feeling, have eroded? What profession does one choose when professions begin to lose their gender image? The self-determination of sex membership, supported by medicine, or the parental decision over their children's sex is in various ways culturally prepared. The more optional sex seems to become, the less meaningful it turns out to be in many respects. Gender studies have always postulated this contingency theoretically, now they must confront the fact that culturalism is not only already rooted in the hard sciences, but also that it has been practised in daily life for a long time. Natural and cultural sciences, sex and gender studies follow up on the same developments that impinge on the two sexes in their deep, cultural layers. The relationship between technification and practiced culturalism can of course be researched only from the perspective of gender studies. They only have to draw two consequences from the erosion of the sex/gender distinction:

- They have to recognise that sexual difference in contemporary Western society is as radically concentrated, varied and recombined in test tubes and operation rooms as in drag

circumstances are fields in which prerogatives can be secured or questioned – they are different resources of the meaningful delimitation between social categories.

- parties and transvestite shows. “Deconstruction” is not simply a critical procedure of the cultural sciences, it rather belongs to the repertoires with which the cultural practice of sexual differentiation works on its own ontological aggregate state – whether in the medium of discourses, technologies or lifestyles.
- Gender studies no longer have to consider research performed on sex by the natural sciences no longer as a political “opponent”, but as an intellectual competitor with whom it shares a common knowledge aim: research into sexual differentiation, i.e. the investigation of a cultural practice, of which it is an integral part. In this competition for what the sexes “really” consist of – genetic codes or cultural codes – gender studies should be better equipped in dealing with the reflexivity of its own knowledge production.

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On the Independence of the Social and Situated Dimensions of Scientific Knowledge from the Notion of Standpoint

M. Cristina Amoretti and Nicla Vassallo

1. Introduction

The main problem addressed in this paper concerns the notion of standpoint and its relationship to different gendered ways of knowing. On the one hand, we recognise that feminist standpoint epistemologies have some merits that cannot be disregarded; in particular, they rightly stress the importance of the social and situated dimensions of knowledge. On the other hand, we would like to prove that the very notion of standpoint inevitably yields essentialism, with awkward and unwelcome consequences for both epistemology and the philosophy of science. This discussion is closely linked to the idea of a specifically feminine way of knowing. On this point, we believe that deciding whether there is a gendered way of knowing is a purely scientific matter, not a philosophical one. Thus, our aim is to show that it is unnecessary to advocate a feminist standpoint epistemology to defend the social and situated dimension of knowledge. In fact, the notion of situated knowledge is independent from the notion of standpoint, because the latter involves additional features such as epistemic asymmetry, reliability, privilege and advantage.

In section 2, we will analyse the notion of standpoint to identify its basic and central features. In section 3, we will consider the concept of essentialism as well as some of its detrimental consequences for epistemology and the philosophy of science. In section 4, we will briefly summarise reasons to believe that feminist standpoint epistemologies actually yield essentialism and must thus be abandoned. Finally, in section 5, we will try to explain why upholding the social and situated dimension of knowledge without endorsing a feminist standpoint epistemology is a feasible option.

2. In search of a precise notion of standpoint

As many scholars have pointed out (Ramazanoglu and Holland 2002, ch. 4), it is not easy to determine a clear, unique and uncontroversial definition of what a standpoint precisely is. However, we believe that it is possible to select a few useful descriptions and extrapolate some common features. For instance, let us consider the following three explanations:

“A standpoint is not simply an interested position (interpreted as bias), but is interested in the sense of being engaged ... A standpoint ... carries with it the contention that there are some perspectives on society from which, however well intentioned one may be, the real relations of humans with each other and with the natural world are not visible ... In addition, the concept of a standpoint depends on the assumption that epistemology grows in a complex and contradictory way from material life” (Hartsock 1983, p. 285).

“Standpoint theorists claim that women’s oppression can be turned into an epistemic advantage. Just as, in Marxist theory, consciousness-raising enables the oppressed to understand the structures that subordinate them better than those who benefit from those same structures, so feminist achieved understanding of their marginal position often enables women to know their oppressors and the systems that legitimate them more clearly than the oppressors know themselves” (Code 1998, p. 223).

“A standpoint ... is an achievement, the result of analysis by more than one person who, in the first instance, occupy a particular social location. When some of the people in a social location work out an account of the conditions of their lives and of their pre-standpoint understanding of the world, they have developed a standpoint. The standpoint will also include an account of the conditions giving rise to their standpoint itself ... A standpoint is ‘struggled for’, arising when people occupying a subordinate social location engage in political struggle to change the conditions of their lives and so engage in an analysis of these conditions in order to change them” (Potter 2007b, p. 239).

Following the above descriptions (see also Collins 2000, p. 24; Harding 1998, p. 150; Potter 2007a, pp. 131-132), it is possible to identify at least three basic tenets intrinsic to the very notion of standpoint:

- a standpoint is engaged; it is the result of critical analysis, and it must be struggled for;
- a standpoint carries with it an epistemic asymmetry: knowledge possessed by marginalised and subordinate groups is taken to be more reliable than knowledge possessed by dominant ones. In the case of feminist standpoint epistemologies, the marginalised and subordinate group is women, and thus women’s knowledge is taken to be more reliable than men’s knowledge;

- a standpoint is an objective position within a hierarchically structured society; that is, there are some social and/or natural facts concerning a particular group (e.g., its cognitive style, common experiences, work conditions and so on) that characterise the corresponding standpoint on the natural and/or social world. Let us analyse these characteristics in detail.

First, a standpoint arises only when people occupying a particular social location within a hierarchically structured society become conscious of occupying that location within society. More precisely, the standpoint of a marginalised and subordinate group is the result of critical analysis by more than one individual about the particular social and/or natural facts and conditions that produce marginality and subordination within their own hierarchically structured society. Such an understanding must be struggled for and represents an achievement for the marginalised and subordinate group in question. Let us consider a patriarchal society as the hierarchically structured society and women as the marginalised and subordinate group. In this situation, the standpoint of women is the result of critical analysis and reflection on what being a woman in a patriarchal system means and what being socially marginalised and subordinate as women is like; hence, such a standpoint is an achievement that must be struggled for.

This implies that merely being a (biological) woman is neither necessary nor sufficient to have the standpoint of women. On the one hand, men can adopt the standpoint of women if they recognise and understand the objective position occupied by the group of women within a patriarchal society; that is, if they appreciate those social and/or natural facts about women that characterise their standpoint. On the other hand, it is unfortunately apparent that some women recklessly accept the androcentric values as well as the oppressive and discriminatory ideologies of a patriarchal society and thus fail to adopt the standpoint of women. Similar considerations can be made for the specific case of a woman scientist. Being a woman scientist within an androcentric scientific endeavour is sufficient neither to become reflectively conscious of one's own marginality and subordination nor to understand that this condition can have undesirable and detrimental consequences on scientific progress and science in general (Keller 1983).

Second, feminist standpoint epistemologists have argued extensively that some deep differences exist between knowledge produced by a marginalised and subordinate group and knowledge produced by a

dominant one. In particular, occupying a marginalised and subordinate social location within a hierarchically structured society yields a better epistemic position (a position that is more epistemically reliable), while occupying a dominant social location yields a poorer epistemic position (a position that is less epistemically reliable). This difference in epistemic reliability between marginalised and subordinate groups, on the one hand, and dominant groups, on the other, has been ascribed to the asymmetry of their disinterest or interest in maintaining the *status quo* of an oppressive system as well as in failing to understand the world as it really is (Collins 2000; Harding 1986, 1991, 1998, 2008; Hartsock 1983; Smith 1987, 1990). Even if it can be maintained that the issue of how and why certain conditions of marginality and subordination actually yield a better and more reliable epistemic position is an empirical matter (Wylie 2003), it is worth noting that social marginality and subordination alone do not assure the kind of disinterest necessary to hold a better and more reliable epistemic position. This is why a standpoint is understood to be the result of critical analysis. In addition, marginalised and subordinate groups can have a dual vision: because they are subjected to the rules of dominant groups, they have insight into the dominant group's perspective, but at the same time they have direct comprehension of their own point of view on nature and society. Such a dual vision yields a better epistemic position when trying to understand the natural and/or social worlds as they really are. Therefore, within a society where hierarchically structured organisations are gendered and where women represent the marginalised and subordinate gender (i.e., patriarchy), the standpoint of women is more epistemically reliable than that of men (Hartsock 1983; Rose 1983; Smith 1987). In the specific case of various sciences, the underrepresentation of women in some scientific institutions can lead women scientists to realise not only that scientific research is undertaken with a dominant male perspective but also that this underrepresentation is neither natural nor necessary; rather, it is simply socially contingent and must be overcome.

Finally, it is pivotal to clarify what it really means to consider a standpoint as an objective position within a hierarchically structured society. As Sandra Harding points out, "What the standpoint of any particular group consists in must be determined by empirical observation and theoretical reflection. A standpoint is an objective position in social relations as articulated through one or another theory or discourse" (Harding 1998, p. 150). Understanding a standpoint as an objective position implies that there are social and/or natural facts concerning

a particular group (e.g., women) that characterise the corresponding standpoint. Hence, one of the main problems of feminist standpoint epistemologies is identifying which social and/or natural facts concerning the group of women characterise women's standpoint as such (and confer upon it greater epistemic reliability). According to Potter, for instance, "regardless of how women and men understand them, many of their *biological processes* and *socially assigned activities* differ" (Potter 2007a, p. 142). Thus, let us begin by analysing biological processes, that is, natural facts.

Although there are obviously many cultural and social aspects of sexed bodies, it is difficult to deny that some biological and natural differences exist between women and men. The most significant differences regard their reproductive systems: for example, only women can go through the direct experience of childbirth; thus, they are exposed to some aspects and regularities of the natural and/or social worlds that are fully and basically inaccessible to men. Hence, it has been argued that women alone may have a personal understanding of those features of the natural and/or social world that are intimately connected to procreation, and for this reason, women have been considered more epistemically reliable than men about these features¹. For a better understanding, let us focus on childbirth: it is a complex natural (and social) phenomenon to which women alone have a privileged epistemic access intrinsically unavailable to men, such as the pain that women experience during childbirth.

Regarding natural facts, it has also been pointed out that some cognitive differences exist between women and men, differences that may be thought of either as innate (Baron-Cohen 2003) or arising from the different mechanisms of identity formation experienced by male and female children during the early period of their lives (Hartsock 1983). Whether innate or cultural, these (presumed) cognitive differences become more evident in societies that are strongly gender-structured and that therefore impose different life experiences on women and men. For instance, a girl might resent the study of mathematics and logic simply because of the common conviction that girls are not good at mathematics and logic, or a boy might be worried by his tendency to be sensitive simply because of the common conviction that boys are insensitive. Cognitive sciences – if not invalidated by sexist and/

¹ Of course, the scope of women's greater reliability is not merely limited to a few natural and/or social aspects directly connected to reproduction.

or androcentric biases – can play a pivotal role in clarifying the origins of these (presumed) cognitive differences (are they innate or socially constructed?) and their relevance (are they significant or not?).

Turning to socially assigned activities, Nancy Hartsock explicitly writes about them, “I will suggest that the sexual division of labour forms the basis for such a standpoint [of women] and will argue that on the basis of the structures which define women’s activity as contributors to subsistence and as mothers one could begin, though not complete, the construction of such an epistemological tool” (Hartsock 1983, p. 284). Again, engagement in social work and activities such as tending children, caring for the young, the aged and the sick, performing unpaid domestic work and so on exposes women to some aspects and regularities of the natural and/or social world that men cannot fully and wholly experience.

3. A note on essentialism

Generally speaking, an essential property of an object is a property that such an object must have, a property that it has necessarily, that it could not lack to be the object it is. Thus, a simple and straightforward characterisation of essentialism is the doctrine that at least some objects have at least some essential properties (Mackie 2006; Robertson 2008).

In relation to feminist theories, the term “essentialism” is often used to refer to the doctrine that “the” group of women has some essential properties that characterise this group as such and, consequently, that its members think, behave and act alike (or ought to do so). To put it another way, essentialism is the idea that there are some fixed, necessary, natural, universal and innate characteristics (e.g., cognitive style, feminine nature and so on) that distinguish the group of women from other groups, such as the group of men. This definition can be extended to include social and/or cultural differences, given that they are still regarded as fixed, necessary and trans-historical conditions characterising the group of women as such (e.g., work condition, common experiences and so on).

Some feminists think that essentialism may provide some positive outcomes. If it were possible to identify some essential properties that characterise “the” group of women and if there were one only shared women’s standpoint, then it would be possible to share women’s experiences, to create a distinctive women’s culture, and to ground female

solidarity. However, it is not difficult to understand that this essentialism has many awkward and unwelcome consequences. If it were possible to single out the essence of woman, then it would be quite straightforward to annihilate and obscure all the great differences among women: all the members of “the” group of women do (or ought to) think, behave and act alike. In Mozartian words, the basic idea of essentialism can be encapsulated in the motto, “Così fan tutte” (Vassallo 2009a).

At the same time, it is easy to emphasise the many obvious differences among women to create conditions of exclusion or, at least, inferiority. If a certain individual does not exhibit the essential properties characterising “the” group of women as such, then this individual simply is not a woman. In other words, accepting essentialism about women inevitably yields the assumption that certain biological features, psychological traits, social roles and behaviours necessarily define group membership and gender identity. Thus, it also yields the conversion of any difference into deviance and creates conditions of exclusion or inferiority. For example, if a woman exhibits a “feminine” trait, it is considered a virtue, whilst if she exhibits a “masculine” trait, it is regarded as pathological.

If one accepts the idea that there are some fixed, necessary, natural, universal and innate characteristics that distinguish the group of women from, for instance, the group of men (e.g., their cognitive style, their feminine/masculine nature, etc.), then one also agrees to recognise essential biological as well as cognitive differences between women and men. This thesis inevitably brings with it the sexist idea that women and men perceive, think and know differently. More precisely: women are seen as subjective, natural, empathetic, sensitive and irrational while men are seen as objective, cultural, unfeeling, insensitive and rational; women perform better than men in tasks regarding memory, linguistic competence, mechanical coordination and so on, while men perform better than women in tasks regarding motor ability, spatial reasoning, geometrical figures and so on (Hines 2004). In this sense, we may say that essentialism brings with it the idea that there is a peculiarly feminine way of knowing, different from other genders’ ways of knowing.

Although studies have attempted to demonstrate that crucial differences exist between women and men in cognitive styles and ways of knowing (Baron-Cohen 2003; Belenky et al. 1986), it should be noted that they are considered dubious and controversial by the majority of scientists. When critically examined, these studies have

shown to be irremediably flawed and inconsistent (Brabeck and Larned 1997; Fausto-Sterling 1985; Tavris 1992)². Let us consider, for example, studies regarding women's presumed inability to perform mathematics: some researchers have extensively argued that women's performances on mathematical problems and operations are worse than men's performances. In spite of this, it has been persuasively demonstrated that women perform better and the average disparity between women and men disappears when the tested group of women is told that a group of men has already performed very badly at the same task or, in the case of Asian women, that they are being tested as Asian people (who, unlike women, are typically regarded as very good at mathematics). In both cases, women's performances are of a high quality because the tested group of women is not influenced by the prejudiced but widespread stereotype that women are worse than men at mathematics.

It is undeniable that the strictness dictated by essentialism clashes with the countless meanings of "being a woman" for different individuals (Spelman 1988; Vassallo 2010) – provided that, of course, we succeed in conferring any meaning to "being a woman". In other words, what "being a woman" means can only be understood from a first-person perspective because it must take into account one's own personal history, age, cultural background, race, religion, sexual orientation, social class and so on (Garavaso and Vassallo 2007; Vassallo 2009a, 2009b). Essentialism, on the contrary, forces its defenders to reject, conceal and even suppress all differences among women and to suppose that all women are subjected to the same prejudices, discriminations and intolerances (De Gregorio and Vassallo 2011; Vassallo 2011b).

In summary, we have briefly shown that essentialism has awkward and unwelcome consequences for both epistemology and the philosophy of science. Thus, it should be rejected without hesitation. For the same reasons, we believe that all theories that directly or indirectly, explicitly or implicitly, consciously or unconsciously yield essentialism (or its problematic consequences) should be discarded as well. What about feminist standpoint epistemologies? What is their actual relationship with essentialism?

² If cognitive sciences were to reveal the existence of real and relevant cognitive differences between women and men, it would not be reasonable to ignore this evidence and continue to affirm the sameness of their cognitive styles.

4. Some reasons why feminist standpoint epistemologies yield essentialism

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Some feminist standpoint epistemologists, such as Nancy Hartsock, somewhat reluctantly concede that the very notion of standpoint yields essentialism: “I recognize that the effort to uncover a feminist standpoint assumes that there are some things common to all women’s lives in Western class societies” (Hartsock 1983, p. 290). Conversely, other scholars, such as Sandra Harding, explicitly try to dismiss essentialism without abandoning the notions of standpoint or feminist standpoint epistemologies (Harding 1998; see also Wylie 2003).

We have extensively argued about the impossibility for feminist standpoint epistemologies to avoid the charge of essentialism (Amoretti and Vassallo 2010a, 2011), but we believe that some basic points still need to be clarified. To understand why feminist standpoint epistemologies inevitably yield essentialism, it is useful to summarise some of their central tenets: (i) a standpoint is an objective position (within a hierarchically structured society) that depends on some social and/or natural facts about the location of the corresponding group; (ii) a standpoint is the result of critical analysis by more than one individual belonging to a particular group about the social and/or natural facts that marginalise and subordinate such a group and make it more epistemically reliable than others; (iii) some social positions, and thus some social groups and their corresponding standpoints, are more epistemically reliable than others; (iv) in the specific case of women, because their group occupies a particular social position that is marginalised and subordinate in a patriarchal society, their knowledge is more epistemically reliable (privileged or advantaged) than that of others.

We find that the basic problem for feminist standpoint epistemologies arises when we reflect on the notion of epistemic privilege or advantage: that is, the idea that certain (marginalised and subordinate) groups and their corresponding standpoints are more epistemically reliable than other (dominant) groups. To ground the notion of epistemic privilege or advantage, it is necessary to refer to some social and/or natural facts concerning the marginalised and subordinate groups in question (e.g., cognitive style, common experiences, work conditions and so on) and explain why those facts bring with them a better epistemic position. Hence, to answer this question of why the standpoint of women is more epistemically reliable than that of men, one must refer to social and/or natural facts concerning women, such as their cogni-

tive style, their common experiences, their particular work conditions and so on. In this way, group membership (being a woman) is rigidly defined by the very social and/or natural facts that ground its epistemic privilege or advantage. To put it another way, the social and/or natural facts that ground the epistemic privilege or advantage of the group of women also single out the essence of woman.

Of course, claiming that men can adopt the standpoint of women is not sufficient to reject essentialism; the group of women would continue to be defined by those social and/or natural facts that ground its epistemic privilege or advantage. Thus, it would still be possible to single out the essence of woman.

Nor is it promising to divide the group of women into transversal subgroups that intersect culture, race, social class, sexual preference, personal history, religion, age, etc., thus admitting the existence of various transversal women's standpoints, such as black, Latina, lower class, lesbian, etc. (Collins 2000; Lugones and Spelman 1986). In fact, no matter how a transversal social group is defined, in order to realise and justify why the corresponding standpoint is more epistemically reliable than others one must refer to some social and/or natural facts concerning the transversal social group in question. Again, group membership (being a black woman, a Latina woman, a lower-class woman, a lesbian and so on) is rigidly defined by those very social and/or natural facts that ground its epistemic privilege or advantage. Obviously, essentialism and its problematic consequences still exist.

Even attempting to deny the existence of any fixed membership and gender identity criteria for the group of women is unproductive. To grant that the standpoint of women is more epistemically reliable than the standpoints of others, one must refer to some social and/or natural facts concerning women themselves. To ground any epistemic privilege or advantage, these facts must be valorised, generalised and idealised. Thus, they must be considered normative requirements that inevitably convert any difference into deviance and create conditions of exclusion (Bar On 2003). In other words, we may be able to discard essentialism, but not its undesirable consequences. Of course, this is not a satisfying result.

Finally, turning our attention to the epistemic value of the experience of marginalised and subordinate people (i.e., particular members of a marginalised group) without making any substantial claims about marginalised and subordinate groups (Harding 1998) is simply to aban-

don the very notion of standpoint and, with it, any feminist standpoint epistemology. In fact, we have stressed that a standpoint is the result of critical analysis by more than one individual belonging to a particular group about the social and/or natural facts that make such a group marginalised, subordinate, and thus more epistemically reliable than others. Thus, if we renounce the characterisation of women as a group (either homogeneous or fragmented), then the notion of standpoint is no longer useful.

Since all of these problems emerge when we reflect on the implications of the notion of epistemic privilege or advantage, an alternative solution would be to reject any such notion. Unfortunately, this implies that all social groups must be considered equally epistemically reliable, and their knowledge of the world must be at the same level. Thus, the notion of standpoint becomes weak or even useless. Again, it is clear that a reason to adopt a feminist standpoint epistemology does no longer exist.

5. Sociality and situatedness of scientific knowledge without standpoints: is it possible?

So far, we have argued not only that essentialism is detrimental for epistemology, philosophies of science and science itself, but also that feminist standpoint epistemologies inevitably yield essentialism (or, at least, its problematic consequences). Abandoning a feminist standpoint epistemology, then, seems to present the best solution. However, things are not so straightforward. Feminist standpoint epistemologies have some merits that are difficult to disregard (Anderson 2010).

Feminist standpoint epistemologies correctly emphasise that knowledge is *situated*: our understanding of the natural and/or social world partially depends on our specific perspective. More precisely, these epistemologies underline the relevance of our particular social location (our specific “situation” or “life context”) in shaping not only our epistemic point of view as subjects of knowledge but also our objects of knowledge. In other words, they point out that the dichotomy between subject and object is overcome because the same social forces that shape agents of knowledge also shape their own objects of knowledge. By overcoming the dichotomy between subject and object, it is possible to represent the natural and/or social world in a way that is neither affected by particular interests and prejudices

nor shaped by androcentric metaphors and conceptualisations of nature and society.

Moreover, feminist standpoint epistemologies rightly hold that there is no single epistemic subject able to produce knowledge independently of other epistemic subjects, and thus they rightly stress the pivotal role of the notions of intersubjectivity, testimony and epistemic dependence. This is evident in everyday life as well as in scientific discoveries: new hypotheses and/or scientific theories become knowledge only after they are tested, evaluated and legitimated by a community of scientists – that is, intersubjectively. It is the scientific community (or one of its subgroups) that takes up a new hypothesis and attributes the status of knowledge to it.

Finally, the standpoint of women can be a useful resource for the sciences for at least three reasons (Potter 2007a, pp. 148-151). First, if we assume the standpoint of women, we may be able to identify new scientific problems and new research agendas that differ radically from those in dominant androcentric frameworks. To put it another way, adopting the standpoint of women may enrich the context of discovery because adopting a different perspective on the natural and/or social world may lead us to detect novel problems and facts that were previously unseen and unconsidered. Second, because women have no interest in defending a distorted (sexist and androcentric) description of the world, it would be easier for women to find new experiments to test and attempt to falsify scientific theories. That is to say, the standpoint of women can play a pivotal role in the justification for producing new knowledge or for identifying justified hypotheses, theories and accounts of nature and society that are “less false” and less distorted than those produced by dominant groups. Third, the standpoint of women may contribute to ensuring the strong objectivity of the sciences (Harding 1991, 1993). To obtain objective results (that is, results not biased by particular interests, prejudices, personal values and so forth), the scientific community normally agrees to adopt particular methods and standards. However, those methods and standards may be considered too weak. Because most scientists are socially dominant men, their own methods and standards are not able to unmask the sexist and androcentric interests, prejudices and values that are widespread and pervasive within the scientific community itself. Adopting the standpoint of women may contribute to revealing and unmasking the (perhaps unconscious, but widely held) sexist and androcentric biases and thus to assuring the strong objectivity of the sciences. These biases include,

for example, biological research that scientifically strengthens sexist and androcentric stereotypes and behaviours through distorted presumptions about women's and men's "different sexual natures" as well as cognitive psychological research that scientifically strengthens sexist and androcentric stereotypes and behaviours through distorted presumptions about women's and men's "different cognitive natures". Unmasking these biases can help us to increase and assess the objectivity of scientific research and to deepen the opportunities to understand the natural and/or social world. Moreover, women have the kind of dual vision that yields a better epistemic position on both the natural and social world and allows them to critically analyse the dominant framework in a way that is inaccessible to the group of male scientists. Hence, women's standpoint can contribute to unmasking methods, models, metaphors and discursive resources that, when they are androcentric and immersed in cultural ideals of masculinity, can limit research and compromise a genuine understanding of nature.

Given all the above considerations, to evaluate whether rejecting the very notion of standpoint may be a promising solution for (feminist) epistemologies, one should answer the following question: would it be possible to retain the merits of feminist standpoint epistemologies while renouncing the very notion of standpoint? We believe that the answer to this question should be "yes".

At the outset, we do not need to theorise the notion of standpoint to maintain that our knowledge of the natural and/or social world is socially situated. The notion of situated knowledge is independent from that of standpoint because the latter involves additional features such as epistemic asymmetry, reliability, privilege and advantage. Thus, we do not need to belong to a specific standpoint to have a particular perspective on the natural and/or social world and, consequently, to have perspectival biases (Antony 1993; Campbell 1998, 2001; Longino 1989, 2001, 2006; Nelson 1990). Moreover, to recognise the social dimension of knowledge (including scientific knowledge) and to evaluate the crucial and widespread role of epistemic dependence, it would be sufficient to analyse (i) the centrality of testimony as a source of knowledge and (ii) our actual scientific practice. On the one hand, if we disregard testimony as a source of knowledge, we would lose a great part of what we actually know. On the other hand, if we examine how new scientific hypotheses and/or theories are produced, tested and eventually accepted and justified, we see that almost all serious scientific research is pursued by large teams of scientists with a huge

70 | variety of expertise (Amoretti and Vassallo 2010b; Coady 1992; Hardwig 1985; Vassallo 2011a).

To conclude, if our aim is to make it easier to identify new scientific problems and research agendas as well as new ways to test a given scientific hypothesis and/or theory, we do not need the notion of standpoint at all. We only need to democratise the various sciences and improve the interactions within and across scientific communities, thus allowing people with different cultural traditions, social backgrounds and personal skills to cooperate effectively in a common scientific enterprise (Anderson 1995a, 1995b; Longino 1990, 2001)³. In addition to the democratisation of the sciences, their pluralism would be the best tool for ensuring their strong objectivity; there is no need to suppose that some perspectives are more reliable, privileged or advantaged than others (as feminist standpoint epistemologies of the sciences do), but it is sufficient to recognise the epistemic authority of every single perspective (Janack 1997). In fact, the presence of various, even conflicting perspectives on the natural and/or social worlds improves critical scrutiny, contributes to recognising and unmasking scientists' sexist and androcentric biases, and may eventually yield the strong objectivity of the sciences (Amoretti 2010). As a consequence of the above considerations, it is worth noting that recognising the epistemic authority of different scientific enquirers (i.e., the importance of epistemic inclusion) becomes not just a moral but also an epistemic matter.

6. Conclusions

We have analysed the notions of standpoint (section 2) and essentialism (section 3) and concluded that essentialism has several problematic consequences for epistemology and the philosophy of science. For instance, in the absence of scientific data, essentialism inevitably brings with it the sexist idea that women perceive, think and know in a particular way that differs from that of other genders. We have shown that there are good reasons for recognising that feminist standpoint epistemologies actually yield essentialism (or at least its consequences) and thus provide evidence for rejecting both of them (section 4). Yet we argued that feminist standpoint epistemologies do contain a significant

³ Here, we intend the democratisation of the scientific enterprise, not the epistemic position of the subjects.

element, namely a stress on the importance of the social and situated dimensions of knowledge. Crucially, however, the notion of situated knowledge is independent from that of standpoint because the latter involves additional features such as epistemic asymmetry, reliability, privilege and advantage (section 5). Thus, we may retain all of the merits of feminist standpoint epistemologies while renouncing the very notion of standpoint, and thus without being committed to essentialism. As a result of this argument, we have stressed (especially in part 3) that whether there is a specifically feminine (or, more generally, gendered) way of knowing is a purely scientific matter, not a philosophical one⁴.

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Statistical Ways of Knowing Gender: Open Questions from a Sociological Perspective

Theresa Wobbe

1. Introduction

In the final remarks of her book *Has Feminism Changed Science?*, Londa Schiebinger concludes: "Feminists have tended to make a distinction between getting women into science and changing knowledge. Getting women in is generally considered the easier of the two tasks. Both, however, depend on proper tools of gender analysis" (Schiebinger 1999, p. 194).

Schiebinger suggests connecting these two strands, both fair participation in science and gender as envisioned in both the culture and the content of science: "While career advancement for women is crucial, it is also clear that women will not become the equals of men unless certain aspects of science and scientific culture open up to gender analysis" (Schiebinger 1999, p. 13).

The various approaches to gender and/in science that have arisen during the last four decades are nicely encapsulated in these quotations. While one prominent line of research has been, and still is, concerned with women's inroads into science and their careers within its system, another significant area of research remains focused on the problem of how science, its content and its cultural practices, are infused through gender. Gender and science studies have principally been concerned with the study of recruitment to research and professional organisations and to science's content as indicated by Harding's understanding of "gendered ways of knowing" (Harding 1996)¹. These approaches reflect both the scope of gendered ways of knowing and its limitations.

¹ According to Harding, this concept of gender challenges conventional Western philosophical assumptions including the paradigm of the abstract, rational human being modelled as

From Harding's research we learn that gendered ways of knowing have a somewhat privileged point of observation, a characteristic which they share with postcolonial studies. We also learn that gender relations consist of relationships between men and women, whereas gendered ways of knowing are concerned with the gendered content of knowledge and its related resources.

Joan Scott inverts the topic in her study of gender. She discusses the uneven epistemological status of gender difference. "I want to insist", she states, "that the term gender is useful only as a question" (Scott 2008, p. 1422). Despite innovative research, Scott argues, gender "most often refers to sexual difference, to an enduring male/female opposition, a normative (if not distinctly biological) heterosexual coupling" (*ibid.*, p. 1424). Instead of conceiving of "women" and gender difference as unstable categories many studies have taken for granted an underlying continuity of gender difference as the unstated premise of research. Scott underlines that gender is meant above all as "an invitation to think critically about how the meanings of sexed bodies are produced, deployed, and changed" (*ibid.*, p. 1423), rather than to understand it as a given and a constant phenomenon (see also Scott 2001).

In the present study I will refer to Scott's invitation to reconsider the almost routinised assumptions about "gender" in order to explore shifting understandings of "men" and "women" and sexual difference. Accordingly, a particular focus of this paper is its interest in classifications and distinctions by which subjects are informed about what can be known about sexual difference and the ways in which "the institutional workings of society ensured that this accounting would seem sound" (Goffman 1977, p. 302).

First, I sketch how sexual difference itself only gained significance in the history of Western science at a distinct transitional moment when definitions of authority and knowing shifted in the transformation of science itself. This metamorphosis was paralleled by radical distinctions, notably between residence and workplace. Interestingly, these bounda-

the "subject". At the same time, Harding maintains that gendered ways of knowing are part of post-war research that began to critically reflect on the global dominance of Western thought. Harding considers that gender studies and postcolonial studies share an interest in standpoint theory, which "articulates the surprising epistemological resources created by the positional power of the weak" (Harding 1996, p. 444). On this basis it follows that gendered ways of knowing, together with postcolonial studies, signal a crisis in the epistemology of the West. For further reflection on standpoint theories see the contribution of Amoretti and Vassallo in this volume.

ries became identified, in turn, with patterns of sexual difference (1). By around 1900, it can be observed that scientific organisations' workplaces and tasks were becoming segmented along sex-typed patterns. I discuss these types of categorisation and classification in the broader context of emerging modern concepts of gainful work (2). In my final remarks, I reconnect to the open question of "gender" as an uneven notion.

The division of people and objects in terms of sexual difference constitutes a specific classification (Goffman 1977). Such classifications are contingent, however, rather than normative (Heintz and Nadai 1998, p. 80). For this reason, it is of particular interest to investigate the very specific conditions and contexts that underpin such classificatory processes, to unpick the ways in which they generate reality, and to explain their significance for the sexual structuration of society. These processes cast light on the complex that Ian Hacking calls "making up people" (1986). Hacking argues that social change creates new categories of personhood and therefore new ways in which individuals can locate themselves within society as well as new ways of being socially located. From this perspective, the concepts of work, worker and occupation are connected to deeper structures of inclusion and belonging which were established in the late nineteenth century.

2. Shifting meaning of science

As Sally Kohlstedt (1999) has documented, it is not only men, but also women who have always investigated their world and have thus been part of the endeavour that became modern Western science. The early modern institutions of the French salon and the *Republic of Letters* (Daston 1991), studies of German craftsmanship and British and Dutch tradesmanship illustrate that these endeavours were still embedded in what was to become known as the family system (Schiebinger 1989).

According to Deborah E. Harkness, in her study of Elizabethan England's prominent natural philosopher John Dee's "Experimental Household", the domestic sphere embodied an important site of knowledge production in the early modern period. The philosopher's wife, "Jane Dee, was expected to be her husband's helpmeet and partner ... overseeing the work of his philosophical assistants and protecting her husband's privacy" (Harkness 1999, p. 23). In her study, Harkness shows how work and residence were conflated within the experimental household.

In early modern society, people tended to live where they worked. As Steven Shapin has shown in his study, scientific practitioner Richard Boyle lived where his lab was situated. His “discussions about scientific findings and theories typically took place in the public rooms of the residences occupied by public persons” (Shapin 1994, p. 409). Or, in other words, “the miller lived at the mill, and when you paid a call on the miller you visited the place where power generated by water turned the wheels that transformed corn into flour” (*ibid.*). Scientific work was a part of the household’s social unit to which it belonged. One of the distinctive characteristics of emerging modern science is the radical disjunction of residence and workplace.

Astronomy may serve as an illustration of this dislocation. In early eighteenth century Berlin, the astronomic household of the Kirch family offers an insight into its pre-modern entanglement as well as its subsequent transformation. The Kirch family’s astronomical observation was closely linked with the single site of work and home. Its organisation was shaped through an intergenerational division of labour between parents and children and neither the authority of knowing nor the instruments of observation were conferred on one single person.

The later move from this corporate family observation within the household to the Berlin-Brandenburg Academy of Sciences brought about a fundamental change. As a consequence of being appointed as the Academy’s astronomer, two males – first the Kirch patriarch and later his brother – received professional status (*Amt*), which set them apart from the rest of the family firm.

The actual site of the academy building embodied a threshold that women were increasingly barred from passing. The observatory itself, inaugurated in 1711, became the representative centre where members assembled. Some years later the presence of the family astronomer Maria Winckelmann-Kirch in the observatory was met with increasing resentment. In particular, she was instructed not to appear in public there when visitors were present (Mommertz 2002; Schiebinger 1989, p. 128ff). As a result, astronomical observation was extracted from the household and was localised within the new institutional framework of the academy: the early modern science organisation (see Frängsmyr 1990).

The place of scientific work was separated from the residence as work and its representation was in the process of change. Workplaces now took on a twofold specialisation: “they are set apart not only in

space, but also in knowledge" (Shapin 1994, p. 409). This divide between pre-modern and modern forms of science corresponds to the creation of new ways of knowing.

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From a more abstract viewpoint, Shapin relates this distinction to the exploration of the research process itself. The transformation of the locus of scientific study/research from the household to the public realm was closely interconnected with the shifting notions of objectivity, authority and credibility. Shapin distinguishes three sequences, that of "trying", "showing" and "discoursing". The performance of the experiment – the trying – could no longer achieve credibility due to rank and honour. In order to transform individual observation into a generally recognised scientific fact, the experiment had to be transmitted to a public space. It was performed among eyewitnesses when transferred from the *backstage* of the household to the frontstage of the Royal Society (Shapin 1988, p. 380ff). Only within this third sequence of critical debate could the individual observation be converted into a subject of discoursing and become a modern fact (Poovey 1994). Research results were now debated publically with respect to the experimental result as opposed to earlier times when it was a gentleman of rank who decided "right" or "wrong". Following Bettina Heintz, therefore we should distinguish the type of social objectivity, which is connected to the credibility of the person, from that of scientific objectivity that grows out of scientific communication itself (Heintz 2000, pp. 254 ff.).

While the early modern household was structured through co-operation within the family unit, constituting a family firm, a hundred years later an entirely different social system of scientific practices emerged. The newly built Berlin University would become the global trendsetter of modern practices in higher education and research with both specialisms becoming a profession for men only, undertaken in the public realm. A masculinisation of science took place as a consequence of this spatial shift.

During the nineteenth century, this new mode of knowing was standardised through professional training and differentiated with regard to methods and objectives in different disciplines. Generating such knowledge required the standardisation of scientific communication and of its measuring procedures. While science expanded its network of communication across national borders and local contexts, the new meanings and techniques of a-perspectival objectivity (Daston 1992), such as quantification and measurement, enabled communicability.

It was in the course of these transformations that the sites of residence and workplace became assigned with sex-typed patterns and concepts of sexual difference. The emerging binary codes of sexual difference coincided with the scientific persona (Daston 2003) of the male researcher, resonating with numerous dichotomies between objective/subjective and rational/emotional, which started to shape the concept of the researcher and his scientific work during the nineteenth century.

This does not mean that women were simply excluded from working in scientific institutions. In the late nineteenth century, the internal world of research organisations became increasingly divided along sex-typed workplaces when different occupations were assigned to men and women. In the case of the United States, Margret Rossiter shows that women were incorporated into scientific employment, “but segregated within it, as the prevailing stereotypes of appropriate sexual roles interacted with expanding scientific research work and changing research strategies between 1880-1910” (Rossiter 1999, p. 287).

Rossiter explored this particular pattern of inclusion, which localised women within the lower segments of scientific employment. Such a pattern should not be misinterpreted as the extension of an established, normative division of sex-segregated roles into the workplace. Rather this pattern represented an historically new phenomenon of “making up people” (Hacking 1986) along lines of sexual differentiation, which shaped emerging research organisations. The basic classification schemes are, however, not particular to scientific work as the sexed classification of workplaces and tasks in this era (circa 1900) belongs to a broader historical context of social change that transformed the very understanding of work and employment.

3. Work and occupation: kinds of categorisation and classification

In the late nineteenth century, statisticians endeavoured to classify the inhabitants of a country as precisely as possible in terms of active and passive components of the population. They carried out this classification largely along the dividing line of women’s and men’s work (Folbre and Abel 1989; Patriarca 1998). In the same period, women’s paid employment grew, became the object of social science expertise and was regulated as a special area of labour legislation (Canning 1996, 2005).

In the course of these complex and highly fluid processes, which contributed significantly to the notion of a sex-segregated labour market,

the modern understanding of occupation itself became institutionalised. Even if ideas of work and occupation still varied between different cultures and regions up until the late nineteenth century, from that point onwards definitions converged more and more (Eckert 2010). In a wider sense, this change should be seen in the context of official statistics (Hacking 1990), the social sciences and the nation state (Wagner 1990)².

Statistical categorisations are instructive here, because they can provide an insight into how classifications do not simply reflect individuals' perception of reality but instead inform it in specific ways. Statistical divisions generate patterns of difference because their objectifying procedures gather disparate things into classes under particular headings – things that only acquire a common meaning through this very process of ordering (Desrosières 1998, p. 236 ff.).

The German occupational census will serve as an example in order to demonstrate the relevance of these endeavours with respect to sex-typed classifications³. The 1882 law on collecting occupational statistics, *Gesetz zur Erhebung der Berufsstatistik*, passed by the Reichstag in January of that year (Statistik des Deutschen Reichs 2, p. 3*; henceforth StdDR), had the objective of

“arriving at precise knowledge about the gainful work of the population as a whole, about its composition in terms of employed persons and dependants, independent traders and assistants, companies and workers, and about the extent and other characteristic features of agricultural, industrial and commercial operations, for the purposes of legislation, administration and science” (StdDR 2, p. 5*, translation Th.W.).

The aim is clear: information on the entire population is to be gathered from the point of view of gainful work, while at the same time the census is also to reveal the structure of the occupations and the relationship between the industrial and agricultural sectors⁴.

² Around 1800, as the previous social and economic constitution was deregulated, a far-reaching transformation of official counting methods and administrative practices took place. Previously, statistical information had been destined exclusively for the rulers, kept concealed from public view, but from now on it would increasingly become public, and thus part of the body of knowledge of private individuals, organisations and governments (Hacking 1986, 1990).

³ Silvana Patriarca (1998) explored similar processes in the context of the making of the *active population* in the Italian context. Her study is of particular interest because it affords insights into the related political role of statistical and social science in the “making up” of people, albeit located in the particular context of the Italian economy.

⁴ In Prussia, data to analyse the population in terms of occupation were first collected in 1816, in the form of tables listing the various trades and callings (on the following points, see Köllmann 1989). From 1822 on, these tables were collated every three years; from 1846 they were

The scope of the census was threefold: 1) with respect to individuals it encompassed their participation in working life and type of occupation; 2) in relation to workplaces, it categorised their sector and geographical distribution; and additionally, 3) the sex, age and marital status of the entire populace was recorded. With regard to social differentiation, the census distinguishes first of all by sex, then by age, marital status, invalidity and widowhood. The German statistics also nominally use the concept of sex for women and men⁵.

The occupational census was intended to discover which of the various occupations “all persons, as earners or breadwinners and as family members or dependants”, belonged to (StdDR 2, p. 8*). At this point, we already see the first signs of a distinction between active and passive members of the population, between the economically independent and the economically dependent, which also left its mark on social insurance at this time in the form of the distinction between benefit recipients and contribution payers.

On the national level, the population of Germany was for the first time comprehensively classified according to the criterion of its productive participation in gainful work and maintenance. The census asked whether individuals “belonged directly or indirectly to the various occupational groups and positions” (StdDR 2, p. 13*). To this end, three core categories were drawn up: *Erwerbstätige* (people in gainful work as their principal occupation), *Dienende für häusliche Dienste* (people providing domestic services and living in the household of their employers) and *Angehörige* (dependants, members of a household not working full time or working only in a secondary capacity). Alongside these, a fourth category, *berufslöse Selbständige* (literally, independent persons without an occupation) was introduced, subsuming the unemployed (StdDR 2, p. 14*).

Looking more closely at the classificatory system (see Wobbe 2012), it becomes clear that individual people are recorded according to the guiding distinction of productive versus non-productive activity; here, the

supplemented by special tables on factories, as required by the Customs Union. With the foundation of the Empire in 1871, a new taxonomy was applied for the occupational categories. In 1872, the first all-German census included a question on occupation, although the results permitted only a “superficial view” (StdDR 2, p. 2*). The key problem lay in the lack of standardisation.

⁵ Such differentiation by gender is not inevitable. For a long time, the guiding distinction applied by the Prussian statistics was that between military and civilian population, and only secondarily did each person belong to a particular sex or age group (Boeckh 1863; Hacking 1988, 1990, p. 23).

obligatory definition by “principal” or “full-time” occupation (*Hauptberuf*) was particular to the German case. The category *Erwerbstätige* functions here as the key concept: as a breadwinner, the “principal activity” of someone in this category is directed at *Erwerb*, earning (StdDR 2, p. 13; StdDR 2, pp. 165*, 168*, italics in the original). At the same time, the term *Erwerbstätige* is used in the sense of breadwinners: those gainfully employed earn the means to maintain themselves and the members of their household. The category expressly excludes the activities of members of the household relating to their own domestic economy and the activities of those “whose gainful work is only secondary” (StdDR 211, p. 13*), but it includes the activities of those regarded as “helping” family members – those who perform unpaid work in the business of a member of the household. These dividing lines make it clear that in the core concept of *Erwerbstätige*, there is to be a strict division between household and workplace activities, and between activities carried out as a principal occupation and those that are part-time or secondary. What this demarcation line excludes are many of the locations and forms of work that are performed by women.

The category *Dienende für häusliche Dienste* covers all those “in a service position who are active *principally* in the domestic economy or in personal services and who live in the household of their employers, thus essentially servants” (StdDR 2, p. 13*, italics in the original). Personal services are understood not as gainful work, not as a productive activity. For this categorisation, the crucial factor is not the actual nature of the work but its context within the household, as the analysis of the 1895 census emphasises. The activity of this group, it notes, “is fully dedicated to the purposes of the household, and does not enter into public interchange” (StdDR 111, p. 15). Providers of personal services are, in this definition, not part of the economic cycle, a feature that they share with wives and housewives:

“In themselves, these servants could be considered working people [*Erwerbstätige*]; however, in relation to the national economy there is no more reason to regard them as such than housewives or other family members occupied chiefly in the household, since both are provided for by working [*erwerbstätig*] members of the household without directly contributing to its earnings” (StdDR 2, p. 13*)⁶.

⁶ The exclusion of servants living in their employers’ household is explained by the fact “that their work – in a comparable way to the work of a housewife – merely contributes to the reduction of expenses within a private household” (StdDR 2, p. 17*).

Like family members, then, the *Dienende für häusliche Dienste* are among the economically dependent people who are maintained by the gainfully employed household members. In this case, too, the criterion is the household context – those performing services at agricultural, industrial and commercial workplaces, in contrast, are counted as *Erwerbstätige* in the occupational statistics⁷. The link with the household is reinforced by the fact that the service providers are equated with family members, who form the third category.

That third category, *Angehörige*, covers people who belong to a household and “are maintained within the household economy without themselves being gainfully active either at all or more than peripherally, and without being in service in their household, and without living independently from their own assets, pensions or annuities ... For the most part, this category thus comprises housewives, children and family members not capable of work” (StdDR 2, pp. 13* f.). Like those in service (*Dienende*), these *Angehörige* are among the passive and economically dependent who cannot provide for themselves and are reliant on others. However, this dependency of the *Angehörige* is defined not by a relationship of service but by membership of the household in the sense of a family affiliation. The *Angehörige* are subordinate to the husband or other head of the household. Even if they carry out particular activities, they still remain economically dependent, because their activity does not fit into the grid of full-time, gainful work.

Lastly, the category *berufslose Selbstständige* (those without occupation) comprises “those heads of households, people living alone, household members supporting themselves only from their own assets or pensions or from third-party resources ... and inmates of institutions who are not at all or only peripherally engaged in gainful work” (StdDR 2, p. 14*).

It will have become clear that in the statistics the principal occupation, in other words full-time paid employment, is considered the core area of economic capacity. The population is divided according to its relationship with market-oriented, contractually regulated full-time work, which – as a workplace-based main occupation – is rigorously distinguished from the family and household. All other forms of work are excluded from the definition of occupation. At the turn of the twentieth

⁷ For a detailed account of the differences between domestic and industrial service providers in relation to their membership of the category *Erwerbstätige*, and of their commonalities in relation to the *Gesindeordnung* (domestic service code), see Wobbe et al. (2011).

century, this interpretation disproportionately affected women, whose life stories did not match up with the dominant pattern of full-time work in the expanding field of large-scale industrial production. After marriage, or at the latest after the birth of their first child, both female factory workers and female servants for the most part withdrew from official working life, even though they did not completely leave the labour market (Frevert 1986, pp. 85 f.).

The economic self-portrait of society that was generated using these four categories gave rise to a new image of the population. The statistical introduction of the occupational schema and its sexual coding coincided with the increasing participation of women in employment and with social science's observation of that change (see Willms 1980). At the same time, women's employment was being legally restricted, and the mobile male employee was becoming firmly anchored in law – two further components in a differentiation within employment law.

In terms of social science, the key issue was not economic productivity, but a concern for the societal upheavals that result from industrialised working conditions. As Kathleen Canning (2005, p. 141; 1998) has shown, this concern for social order was deeply marked by interpretive patterns based on gender binaries: if measures directed at male workers were determined by the semantics of law and insurance, at the heart of measures directed at female workers was the notion of protection.

The institutionalisation of female workers as a distinct group can be retraced by considering its legal consolidation. Around 1900, special laws regulating women's labour were passed in all European countries, as well as in North America and Australia. Fundamentally, these amounted to a restriction or prohibition of factory work, combined with various measures for maternity protection; in Europe, the prohibition of women's night work was the focus of such legislation (Wikander 1995)⁸.

The statistical classification favours the identification of distinctions like productive/non-productive, active/passive, independent/dependent with gender categories, spurring on the gendering of people, forms of work, sectors and notions of productivity. Normative life is, however,

⁸ Night work was prohibited as follows: Switzerland in 1877, Britain and Germany in 1878, France in 1892, Sweden in 1909, Spain in 1912, Russia in 1905 and the Soviet Union in 1918. Women's working day was restricted by the state in Britain to twelve hours in 1844 and ten hours in 1847, in France to eleven hours in 1892, in Italy to twelve hours in 1902, and similarly in twenty states of the USA between 1909 and 1917 (Bock 2000, pp. 212 ff.).

breathed into this description by the social-scientific definition of expectations placed on the behaviour of people capable of work. In the context of protective labour legislation for women, the generalised understanding of gainful work takes specific shape as gendered, non-interchangeable work roles. It was only this differentiation of employment roles that initiated in earnest the social differentiation whose effects still occupy research today.

The construction of the occupational grid can be located in the context of “making up” people. Counting is preceded by a classification that, in turn, is tied to interpretive patterns structured on sex differences. Women are understood primarily as passive parts of the population, restricted legally and limited in their mobility as female workers, whereas men are understood to be mobile persons with a full complement of employment and matrimonial rights. Women’s dependence and need for protection arises in parallel with their independence. This attribution is not without consequences, for the traits associated with it “stick” to individual women. People are “made up”, and this impacts upon the way they situate themselves and others.

The gendered categorisation of people, jobs and places that was generated around 1900 left deep marks in the organisation of work, and continues to be effective today even though the structural conditions of its emergence no longer apply. Studies show that routines of gendering and classification have embedded themselves in organisations: routines that – once they are institutionalised in formal structures and informal traditions – prove highly resistant to change (Ridgeway 1997). Such categorisation has substantial social acceptance and symbolic significance precisely because it does not require individual intention or deliberation, but instead functions as a taken-for-granted framework (Fiske 1998; Reskin and McBrier 2000).

The shifting meaning of work and occupation around 1900 can be considered an example of the “task of objectifying”, i.e. the classificatory process of “making things that hold” (Desrosières 1998, p. 9). It was in the late nineteenth century that work and the labour market were made sex-typed and identified with the sexual difference resulting in “making up” people.

The establishment of occupational statistics was a structural turning point for the gendered coding of occupation and gainful work. Around 1900, an observational grid was institutionalised that restricted the modern economic understanding of work – closely interwoven with sexual classification – to lifelong, market-mediated, gainful employment.

This process casts interesting light on the complex that Ian Hacking calls “making up people” (Hacking 1986). This is what happened around 1900: in the schema of occupational statistics, individuals were sorted according to whether or not they belonged to the group of “active” persons capable of work. Belonging to one or the other of these classes had – and still has – consequences for people’s identity and their access to resources.

Therefore, the study of statistical classification schemata should gain more relevance in social studies of science. This approach offers an insight into how social sciences contributed to “making up people”. It shows that classifications into masculine and feminine occupations had to be made up: they are based not primarily on the content of the work itself, but on the assumed masculinity or femininity that is ascribed to the various activities.

Let me reconnect these results to Scott’s invitation to consider “gender” an unstable and contingent category. Using the lens of the sociology of knowledge, we can conclude that the sex-typing of people is part of a broader way of knowing what can be known about “women” and “men” and the sexual difference in various social fields.

Against this background, the problem of observing the complexity of phenomena in the medium of gender difference without observing the differences themselves may become more visible. As Stefan Hirschauer argues in his contribution to this volume, we should raise the question “how gender difference is produced within and through knowledge production” (p. 30). The neglect of this production implies a certain meaning of gender. According to Hirschauer, gender difference is conceived of as a quality of persons. The “location of gender in persons ... assumes a questionable long-term relevance of sex membership” (*ibid.*) in terms of an independent variable. Or, to rephrase this idea: the determination of gender difference as a quality of persons fixes gender difference as a stable sexual typing of persons.

This means, among other things, that it is necessary to be concerned with questions such as: how and in what context were representations of masculinity and femininity produced? At what moment in the conceptual life of science or politics did distinctive categorisations of maleness and femaleness emerge and to what extent do they correspond with certain processes of classification grids or standardisations? And, how did the belief of these meanings receive cultural relevance and become stabilised as belief systems that are taken for granted? The point of how meaning and representation succeed in becoming structures and how they gain evidence in our understanding of social relations is central to the view of gendered ways of knowing.

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II.

BOUNDARIES OF GENDER IN SCIENCES

The Sexed Brain: From Neurosexism to Neuroethics

Catherine Vidal

1. Introduction

Despite major advances in neuroscientific knowledge, the topic of sex differences in the brain is still a matter of controversy and a source of misleading interpretations. In the 19th century, the size of the brain was a key argument used to uphold the hierarchical relationship between men and women, understood to reflect innate differences in mental capacity. Nowadays, our understanding of the human brain has progressed dramatically, with the development of brain imaging techniques such as MRI (Magnetic Resonance Imaging). These new tools have revealed the importance of cerebral plasticity and the role of environmental factors in shaping the brain via experience and learning throughout our lives. As a result, all human beings, whether men or women, have different brains.

However, despite the evidence of brain plasticity, the idea that biology is a major determinant for sex differences in cognition and behaviour, is still alive and well. The media are far from being the only culprits. Some scientific circles actively support the view that the primary causes of gender differences lie in the brain, in preference to any other type of explanation.

In this paper, I present a critical analysis of select examples which emphasise deterministic explanations to account for sex differences in cognition and behaviour. To shed light on the data and the methods used in some papers, we can now – with today's knowledge of cerebral plasticity – challenge more strongly than ever before, many false interpretations. This approach fulfils the dual goal of this research project, to provide evidence against modern archaic beliefs in biological determinism of sex differences, and to promote a positive image of scientific research.

2. Brain size, sex and intelligence

In the 19th century, the size of the brain was used to justify a hierarchical relationship between men and women, races and social classes (Gould 1981). The famous French anatomist Paul Broca had identified an average difference of 150 g in the mass of men's brains (1.350 kg) compared to women's brains (1.200 kg). He stated:

"One wonders whether the smaller size of women's brains is due to the small size of their bodies. But let's keep in mind that women are, on average, slightly less intelligent than men. Therefore one can conclude that the smaller brain of women is explained by their inferiority in both size and intelligence" (Broca 1861, p. 171).

Indeed, ideology was stronger than scientific objectivity, and although at that time it was already recognised that brain volume is not necessarily linked to body size nor to intellectual capacities – for instance, the brain of Anatole France weighed 1kg while Turgenev's brain weighed 2kg – for Broca and his colleagues the equation "brain volume = intelligence" stood firm with reference to women:

"On average, the brain mass is larger in men than in women, in clever men than in ordinary ones, and in superior races than in inferior ones ... There is an obvious relationship between intelligence and brain volume." (Broca 1861, p. 172).

Broca would not have wanted to know that Einstein had a brain of 1.250 kg - a "woman's sized" brain!

3. Brain, reproduction and sexual orientation

Biology is one of those areas where sex differences are quite clear cut – at least at first sight. Almost no one disputes that the sexes differ physiologically, in hormones and anatomy, or that there are sex differences in the brain related to men's and women's different reproductive processes. The female and male brains are different in one significant aspect: the region of the hypothalamus which controls the genitals and reproductive functions. This part of the brain is responsible for regulating the secretion of a cocktail of male and female hormones which differs in men and women. Thus, in women, the hypothalamus shows a cyclic activity to induce ovulation, which is not the case in the male brain.

In 1991, the American anatomist Simon LeVay, published a paper comparing brains preserved in formalin taken from men, women and

homosexual men (LeVay 1991). He found that a tiny nucleus in the region of the hypothalamus had an average volume of 100 microns (a tenth of a millimetre) in heterosexual men (16 individuals), while the volume was 50 microns in both women (6 individuals) and homosexual men (19 individuals). The conclusion of LeVay's paper was: "Our findings suggest that sexual orientation has a biological substrate". It is important to note that a 50 microns difference corresponds to a few dozen neurons, which is extremely small when compared to the 100 billion neurons of the human brain. The claim that such a tiny nucleus may account for the complex question of sexual orientation is merely speculative. Also the data were obtained from a limited sample of brains. Another experimental bias of LeVay's work is that the homosexual men represented in the study had died of AIDS. Yet, the AIDS virus is known to produce lesions in the brain. Thus, comparing AIDS infected brains with other non-infected brains is not valid. Up to now there is no serious scientific evidence for any biological determinism of homosexuality (Jordan-Young 2010).

4. Cerebral plasticity and gender learning

The human brain is made up of 100 billion neurons and 1 million billion synapses, which are the junctions between neurons, while there are only 6,000 genes involved in the nervous system. This means that there are not enough genes to control the building of our billions of synapses. In the course of embryonic development the genes play a key role in designing the basic architecture of the brain. At birth, however, the brain is by no means hard-wired. Only 10% of the 100 billion neurons are already inter-connected. The synapses of the remaining 90% will then be progressively constructed in ways which are influenced by family, education, culture and society. This ability of the brain to shape itself according to life experience is called "cerebral plasticity".

The new brain imaging tools like MRI clearly demonstrate this. For instance, the brains of professional pianists show higher thickness of the gray matter of the neocortex in the regions controlling finger movements and audition (Gaser and Schlaug 2003). This thickening is likely due to the building of additional synapses and, importantly, it is proportional to the time spent in piano training during infancy. The same process happens in adulthood. In taxi drivers, there is a thickening of the brain regions which control spatial orientation and memory, this process being proportional to the number of years of taxi-driving experience (Maguire

et al. 2000). Moreover, the changes in cortical thickness can be reversible. In subjects learning how to juggle three balls, MRI performed after three months of training shows a thickening of the brain areas which control hand movements and vision. Then, when the subjects stopped practising, the brain images revealed a shrinking of those regions which had been thicker (Draganski et al. 2004).

Training also impacts on the structure of the white matter fibre tracts which connect brain regions to each other (Guye et al. 2008). Experienced, professional players of the ancient Chinese board game GO, develop larger regions of white matter in brain areas involving attention, working memory and executive functions (Lee et al. 2010). It has also been shown that only two months training in a memory task induces an increase in white matter signal, which is correlated with the improvement of memory capacity (Takeuchi et al. 2010). Another substrate of plasticity in the adult human brain may be the production of new neurons (neurogenesis). Recent evidence suggests that the act of learning may be able to recruit new neurons from the pool of cells with neurogenic potential, particularly in the hippocampus (Pereira et al. 2007). These are just a few of the wealth of recent empirical studies which illustrate the impact of physical and mental training and practice on brain structure and function (Nithianantharajah and Hannan 2006).

The plasticity concept offers a perspective on biology that transcends neurogenetic determinism which implies that structure precedes function. We know now that brain function may well precede brain structure. Plasticity challenges the old dichotomies of nature and nurture by showing that the phenomena of human existence and experience are simultaneously biological and social (Rose 2006). Specifically, it affords new insights into the question of the origin of brain differences between the sexes. Experience in the socio-cultural context involves gender learning processes which interact with the biological processes (Fausto-Sterling 1992, 2000). In the young child's life, gender roles and stereotypes prescribe experiences and behaviours for girls and women that differ from boys and men in various fields of socialisation. Brain structure and function then mirror such gendered experiences.

5. Brain, sex and cognitive functions

The media regularly echoes scientific studies claiming that cerebral specialisation differs between men and women. Influential theories on

the hemispheric differences between the sexes, concerning language, spatial cognition and mathematics appeared over 30 years ago. They continue to be cited and inspire the public despite their lack of validation by contemporary studies.

a. *Multitasking*

In 1982 a neuro-anatomical study showed that the *corpus callosum*, a bundle of fibres connecting the two cerebral hemispheres, was thicker in women than in men (Delacoste and Holoway 1982). This apparent physical difference has been used to posit a wider range of gender differences. A thicker *corpus callosum* could enable the two brain hemispheres to communicate better, and thus explain the multitasking capability of women and their skills for learning languages. One should keep in mind that this statement was based upon the examination of 20 brains preserved in formalin. Since that time, thousands of brains have been analysed, using much more precise techniques like MRI. Recent meta-analysis of 50 MRI studies including 2000 men and women, have shown that there is no statistical difference between men and women in the thickness of the *corpus callosum* (Bishop et al. 1997; Wallentin and Mikka 2009).

b. *Language*

The idea that sex differences in language lateralisation accounts for better language skills in women is a source of particular controversy (Kaiser et al. 2009). In 1995 an MRI study revealed that women used both brain hemispheres when performing a language task, while men used only the left hemisphere. Only 19 male and 19 female subjects took part in the experiment. Later meta-analysis of 24 such experiments conducted on 700 subjects between 1995 and 2004 found no statistical difference between the sexes in the hemispheric distribution of language zones (Sommer et al. 2004; Kaiser et al. 2009). When a large sample of subjects is analysed the sex differences thus disappear. This is explained by the fact that the location of language zones varies considerably from one individual to the next. The differences between individuals of the same gender are so great that they outweigh any differences between the sexes. It appears that each individual has his or her own way of performing a language task, reflecting his or her personal experience and the plasticity of his or her brain.

c. *Spatial orientation*

Another current view is that the perception of space is more accurate in men than in women. Experimental psychology does indeed show that men often perform better on tests of mental rotation of 3D objects (Voyer et al. 1995). The extent to which biology and environment can affect mental rotation performance is a matter of controversy (Coluccia and Louse 2004; Hyde 2005). MRI studies aimed at correlating performance to brain structure and function have yielded inconclusive data. These studies have used small subject samples that preclude the determination of whether the female and male brains fundamentally differ in processing visuo-spatial information. Moreover, MRI images of sex differences in neuronal activation during a spatial task do not provide any information about the origin of the differences. The supposed biological advantage of men may be due to the educational and social environments which thereby impacts on neuronal circuits and cognitive performances.

An additional factor influencing performance is the situational context in which tests are administered. Stereotype threats have a strong impact on performance (Schmader et al. 2008). For instance, if before carrying out the 3D rotation test in a classroom, pupils are told that this is a geometry exercise, the boys will generally get better results. But if the same group is told that this is a drawing test, the girls will perform as well as the boys (Massa et al. 2005). These findings clearly show that self-esteem and internalisation of gender stereotypes, and not biology, play a decisive role in spatial performance.

d. *Mathematical skills*

Another popular idea is that the male brain is more suited to abstract reasoning, in particular in the field of mathematics (Halpern et al. 2007). This proposition is based on claims that boys are predisposed from birth to develop the skills required by mathematics and science. It is also argued that men exhibit greater abstraction than women in intellectual performance and as a result predominate at the highest reaches of mathematical talent. Research in cognitive psychology in human infants, children and adults fails to support these claims (Hyde and Linn 2006; Feigenson et al. 2007). There is behavioural and brain imaging evidence that mathematical reasoning develops from a set of biologically based cognitive capacities that males and females share (for

review see Spelke 2005). This is illustrated by recent studies published in 2008 in the journal *Science* (Guiso et al. 2008; Hyde et al. 2008). A previous survey launched in 1990 in the United States and involving a sample of 10 million pupils showed that, statistically, boys did better than girls in mathematics tests. Certain people interpreted this result as a sign of the inaptitude of the female brain for mathematics. A replica of the survey, commissioned in 2008, produced very different results, on this occasion showing girls scoring as well as boys (Hyde et al. 2008). It is hard to imagine that in less than two decades a genetic mutation has increased women's aptitude in mathematics! In fact, these markedly different results are more likely due to the development of the teaching of science and the growing gender mix in scientific fields. Another study carried out in 2008 on 300,000 adolescents in 40 countries clearly showed that wherever the socio-cultural environment is more favourable to male-female equality, the girls score better in mathematics tests (Guiso et al. 2008). In Norway and Sweden the results are comparable. In Iceland, the girls beat the boys, while the boys outperform the girls in Turkey and Korea.

Yet, despite the evidence that social and cultural factors account for the persistent scarcity of women in fields like science and technology, the prejudice in favour of biological determinism persists. This view was expressed in January 2005 by the former president of Harvard University, Lawrence Summers, who asked "whether innate differences between men and women might be one reason fewer women succeed in science and math careers" (Boston Globe, January 17, 2005), leading to a wide controversy and eventually to his resignation from the presidency in 2006.

6. Sex hormones and economic behaviour

Whether or not sex hormones, particularly testosterone, act on the brain to mould personality characteristics is being widely debated today (Cohen-Bendahan et al. 2005; Archer 2006; Jordan-Young 2010). According to the *brain organisation theory* launched in the 1960s, traits related to competition, aggression or risk-seeking behaviour result from a masculinisation of the brain due to prenatal exposure to testosterone (Money and Ehrhardt 1971). A major weakness of this theory is that it claims that the action of testosterone at an early stage and for a short period of time during the pregnancy, produces enduring hard-wiring of

neuronal circuits. This notion is contradictory to the evidence of brain plasticity during the development of children, which continues during adulthood. Despite the poor credibility of the theory, it continues to survive and even inspire contemporary research.

In a recent publication, J.M. Coates and J. Herbert from Cambridge University, conducted a study about the relationship between testosterone and economic behaviour (Coates and Herbert 2008). The experiment measured the level of testosterone in a group of 17 male traders in the City of London and correlated it with the day's profitability. The results showed a significant correlation between high testosterone, financial risk-taking and economic return. The authors concluded that

"acutely elevated steroids may shift risk preference and even affect a trader's ability to engage in rational choice ... This effect, even if confined to a small number of people, could cause financial markets to deviate from the prediction of rational choice theory".

In the current context of the economic crisis, this paper has been largely echoed in the media, and particularly in the financial world. The idea spread that if Lehman Brothers had been Lehman Sisters, their financial performance would have been better. Even Christine Lagarde, the French Minister of Economy at the time, declared that "libido and testosterone level influence some operators of the financial market" (Le Monde, October 13, 2010).

However, such an interpretation of the original publication is a definite distortion from experimental data. First of all, the paper does not demonstrate that an increased level of testosterone in a trader's brain might influence his or her behaviour. Testosterone was only measured in saliva samples, which do not predict the actual testosterone concentration in the brain. The "evidence" of the relationship between testosterone and economic behaviour is merely correlative and does not imply causal inference. Also, the data obtained from a sample of only 17 subjects is not statistically representative of the whole population of traders.

In a paper published in 2009, Swedish researchers addressed the same question with a much more rigorous methodology (Zethraeus et al. 2009). To investigate whether there is a causal relationship between sex hormones and risk taking behaviour they studied 200 postmenopausal women treated with estrogen, testosterone or a placebo. Blood samples were collected to measure unbound bioactive testosterone, which

is a more reliable method than salivary measures. After one month of treatment the subjects participated in economic experiments with real monetary payoffs to measure financial risk taking, reciprocal fairness and trust. The results did not show any significant effect of testosterone or estrogen on the tested behaviours. This study of effective statistical power does not offer any support for the hypothesis that sex hormones affect economic behaviour. It was ignored by the media.

7. Sex and moral judgment

A growing number of research papers are now devoted to the study of the neuronal basis of moral cognition. Functional magnetic resonance imaging (fMRI) is the favourite method to investigate the brain regions involved in moral judgment (Illes and Racine 2005; Illes et al. 2006). A recent paper has addressed the question of sex/gender differences in moral sensitivity for the first time (Harenski et al. 2008). The neural correlates of moral sensitivity were tested in 14 females and 14 males. They were scanned using fMRI while viewing a series of pictures, half of which depicted moral violations, e.g. a man threatening a woman with a knife. In each trial, a picture was first displayed for 6 seconds, during which the participant determined whether the picture represented a moral violation. Next, a scale bar was shown and the subject was asked to rate the severity of the moral violation on a scale from 1 (none) to 5 (severe).

The results showed that brain activity during picture viewing did not differ between men and women. However, differences in brain activation levels were observed when the subjects rated the degree of the moral violation. Women showed increased activity in brain areas associated with emotions (posterior and anterior cingulate, anterior insula) while men showed increased activity in regions involved in cognitive processing (superior temporal sulcus). The authors concluded that their data are consistent with the current view that women are believed to approach moral dilemmas with a care-based orientation whereas men tend to adopt justice-based moral evaluations:

“Males may have used executive resources to evaluate multiple contextual aspects of pictures in evaluating violation severity, whereas females may have focused more on the perception of individuals in distress, e.g. the target of a moral transgression”.

Such declarations when conveyed to a lay public prompt people to believe that men would be more reliable than women in moral judgment because they have a more rational brain, or “so says science”.

To challenge this interpretation, it is crucial to shed light upon the methods and basic procedures employed in experiments using fMRI. Three main points have to be considered:

- Brain differences observed in a few dozen participants are not statistically meaningful. Evidence has accumulated that whenever a large number of subjects are analysed the differences between sexes most often disappears, due almost certainly to the high inter-individual variability in brain functioning (e.g. in language areas as described above).
- Findings have been obtained in the artificial context of a laboratory, which cannot be extrapolated to real life experiences of moral judgment.
- The visualisation of fMRI data provides only a snapshot image of the current state of an individual’s brain. It does not give direct evidence about the biological factors or the socio-cultural processes that have influenced that state. Seeing sex differences in brain structure or function does not imply that the differences existed at birth nor that they will remain engraved in the brain.

8. From neurosexism to neuroethics

Despite the current evidence of brain plasticity, the neuroscientific interpretation of sex/gender differences which highlights biological determinism is still widespread. Biodeterminism goes along with a reductionist conception of the human person, which reduces mind to brain, brain to molecules and molecules to the products of genes (Rose 2006). In the contemporary boom of genetics and neuroscience, the brain has become the focal point to depict individuality and subjectivity (Illes et al. 2006; Ortega and Vidal 2007; Choudhury et al. 2009). The emergence of the field of neuroethics is symptomatic of such a situation. One major preoccupation is the use of MRI studies for understanding human personhood reduced to coloured brain images (Racine et al. 2005, 2010). Such reification of thought encourages essentialist explanations of sex differences. Neurosexism, i.e. sexist bias in the interpretation of brain research, is easily picked up by the media and echoed in the general public (Fausto-Sterling 2000; Fine 2010; Jordan-Young 2010; Vidal 2011).

An important goal in the coming years is to encourage ethical reflection on the societal implications of neuroscientific findings on sex/gender. This requires that self-critical practices emerge from neuroscientists themselves and raise awareness of the social context in which they work. Building an interdisciplinary dialogue across the social and biological sciences will help researchers to reconsider their theoretical and practical frameworks to elaborate a new approach between gender and the brain. Another challenge is to promote effective communication to the public about controversies, and failed controversies, on sex/gender in light of the present advances in brain research. The notion of brain plasticity is a key idea for counteracting biological determinism and linking together neuroscience, gender and society for a gendered way of knowing.

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Arguments about Female Deficiencies in Changing Discursive Clothes: From the “Humournome” via the Genome to the “Hormonome”

Marlen Bidwell-Steiner

1. Introduction

Attempts to render intelligible the meaning of the human body have captivated Western researchers throughout the ages. Their readings have shown significant shifts ever since scientific inquiry first focused on the topic. Yet some aspects have remained surprisingly stable over the centuries, despite ever more rapid paradigm-shifts. One of these revenants is the idea that woman is a deviant variant of the ideal, masculine, human prototype – irrespective of whether a one- or two-sex model (Laqueur 1990) is preferred. This cultural phenomenon of *longue durée*, with an apparent flair for adapting itself to new scientific contexts, deserves closer inspection. How is it possible that the same misogynistic stereotype has been perpetuated throughout the centuries, despite marked changes in scientific points of departure, tools and objectives? Phrasing the question in this way implies that the answer is unlikely to be found in the inventory of science itself. My thesis is that there are significant and consistent features in common within the underlying narrative and rhetorical patterns, by which “female deficiency” is continually re-expressed amidst the shifting of scientific paradigms.

In the following article I will trace three important stages in this meaning-construction process within the history of science – late Renaissance natural philosophy, positivist approaches of the nineteenth century, and recent discourses on the interplay between body and brain. This comparison of definitions of the human body across such broad and diverse periods of scientific inquiry should help us to read

the history of science not merely as a success story tending towards ever more accurate models, but rather as a discipline deeply embedded in its socio-political and cultural environment. In fact, the following material encapsulates the pre-history, core period and aftermath of a positivist conception of the human person. It enables us to “discover that matter is fully sedimented with discourses on sex and sexuality that prefigure and constrain the uses to which the term can be put” (Butler 1993, p. 29). In this contribution, therefore, I will combine an archaeology of discursive patterns, as offered by Michel Foucault, with a narratological approach that relies on psychoanalytic readings. This theoretical framework will lay bare the hidden and repressed elements in cultural and scientific elaborations.

To shed light on how changed paradigms of an inferior quiddity (or essence) of woman became new mainstream knowledge, I will analyse passages in key texts of the periods under consideration and thereby highlight their respective proto-feminist or post-feminist countermodels. The three selected test-cases are the *Examen de ingenios para las ciencias* by the Spanish medical philosopher Juan Huarte de San Juan (1575), *La donna delinquente* by the Italian physiognomist Cesare Lombroso (1893)¹, and a recent publication on neuro-psychology, *Gehirn und Geschlecht*, edited by the German cognitive scientists Lautenbacher, Güntürkün and Hausmann (2007). All three texts have had an enormous and enduring impact both on their respective disciplines and on the wider public. By means of such a comparison, I want to underline the fact that both mainstream and competing alternative discourses draw their arguments from the same scientific grounds. This exemplary history shows that successful alternatives to “malestream” master discourses may principally be observed either in the limited or temporary changes they initiate within their discipline, or in their effects on various subcultures. Despite – or rather because – hidden prejudices in scientific gender definitions have been convincingly unveiled within their own frameworks, they continue to remain vivid “words of a conversation” (notion by Stanley Cavell 1981), and as such help to maintain a remarkably stable gender hierarchy.

Thus, I take up and rephrase Sandra Harding’s question: “Why has the widespread availability of more accurate information about purported racial [gendered] difference had so little positive effect on

¹ Lombroso published the text together with his son-in-law, Guglielmo Ferrero, but researchers agree in regarding the concept as his own.

scientific practices?” (Harding 2005, p. 20). The historical-comparative reading which I am privileging in this paper indicates that the “failure” of feminist critique is not strategic, but rather structural. Could the gender bias be inscribed in the very practice of science, in “doing science”? If we draw such a conclusion, a feminist approach toward gender equitable knowledge might have to consider “undoing science” (a notion drawing on Hirschauer 2001) – a proposition to which I will return in my conclusion.

To conceive the seemingly meta-historical phenomenon of female deficiency, I refer to what Joan Scott terms “fantasy echo” (Scott 2001). Scott elaborates on the psychoanalytic concept of *primal fantasies*, which she understands as “the myths cultures develop to answer questions about the origins of subjects, sexual difference, and sexuality” (Scott 2001, p. 288). Fantasy is at work when identities are constructed: it “has a double structure, which at once reproduces and masks conflict, antagonism, or contradiction” (Scott 2001, p. 288). Thus, if fantasy represents narrative continuity, Scott sets Echo/echo as the moment of alteration. As such, echo produces the subject in a “play of repetition and difference among signifiers” (Scott 2001, p. 291 quoting Nouvet 1991, p. 114). Obviously, in the process of fantasising new scenarios for identity, the signifiers remain stable – self and other – with echo as a measurement of the difference between the two. Scott’s playful “tool” (Scott 2001, p. 304) helps us to understand why some narratives have such a familiar undertow even while constantly reasserting their semantics.

2. Of women and beasts

Such constructions of identity become especially urgent whenever social arrangements tend to dilute. Consequently, in times of change, the validity of claims for downgrading the female need to be revised. The meta-historical characteristics of this very process are the surge of revised definitions, in tandem with the emergence of a new technology of power under specific socio-political conditions and the assembly of old stereotypes into new contexts, such as the metaphorical conflation of woman, nature and deviance. This last trait becomes strikingly evident in my first crucial text for analysis:

“... aunque es verdad ... que el ingenio y habilidad de la mujer sigue el temperamento del cerebro y no de otro miembro ninguno, pero es de tanta fuerza

y vigor el útero y sus testículos para alterar todo el cuerpo ... Pero el miembro que más asido está de las alteraciones del útero, dicen todos los médicos que es el cerebro, aunque no hallan razón en qué fundar tanta correspondencia. Verdad es que, por experiencia, prueba Galeno que, castrando una puerca, luego se amansa y engorda y hace la carne tierna y sabrosa; y, con los testículos, es de comer como carne de perro. Por donde se entiende que el útero y sus testículos son de grande eficacia para comunicar a todas las demás partes del cuerpo su temperamento; mayormente al cerebro, por ser frío y húmido como ellos, entre los cuales (por la semejanza) es fácil el tránsito”² (Huarte 1991 [1575], p. 303).

This repulsive diatribe forms part of chapter XV in what is deemed to be the founding text of Spanish psychology, the *Examen de ingenios para las ciencias*. Published in 1575 by the physician Juan Huarte de San Juan it soon became *the* Spanish bestseller of the late Renaissance: the book saw 77 later editions in seven different languages. This is all the more noteworthy as neither its philosophical background, nor its literary value, can be qualified as highly innovative. But obviously the text struck a chord at its time. To understand this success story I have to elaborate on its main argument. The Spanish physician claimed to offer nothing less than a precise mapping of the specific physiological constitutions which determine an individual’s talent for different professions and social duties. To this end, Huarte discusses the temperament (humours) required of lawyers, philosophers, physicians, theologians, teachers and the king; he does not even flinch from explaining the temperament of Christ! From a modern perspective this cartography of the social body seems highly problematic, given that it closely resembles later eugenic and racist programmes. Huarte’s affiliation to the precarious social strata of *conversos*, converted Jews, adds further unease to this impression.

However, in my reading of the text, Huarte’s focus is primarily concerned with inclusion rather than exclusion. To understand this seemingly contradictory argument one has to refer to the socio-political context in which he was writing. The Spanish Empire under Philip II suffered from absolute deadlock: its economic situation was marked by the

² “... although it is true ... that the talent and skill of the woman follow the temperament of the brain and not any other organ, the uterus and its testicles are still of sufficient power and strength to change the whole body ... But all doctors hold that the organ which is most affected by the changes in the uterus is the brain, although they cannot find a reason for stating such a correspondence. It is true from experience, and proved by Galen, that if you castrate a sow, then it becomes gentle and fattens and the meat becomes more tender and tasty, whereas with the testicles, it tastes like dog’s meat. Therefore, it is to be assumed that the uterus and its testicles are greatly effective in communicating their temperament to all the other body parts; mostly to the brain, because, like them, it is cold and humid and therefore the passage between them is easy (by resemblance)” (translation my own).

struggle with enormous monetary inflation and its productive output was poor due to a proliferation of aristocrats coupled with a restrictive lack of social mobility. Against this backdrop, Huarte can be considered to have been a social reformer; a doctor who placed his professional expertise in the service of restoring the nation's strength. He pursued a strict materialistic approach and defied both Catholic metaphysics and the aristocratic code of honour alike. His physio-psychological screenings clearly advocate broader access to positions of power for gifted individuals from the lower social strata. And, indeed, one may infer a subtext in which the marginalised experience of the *conversos* is deemed to better qualify them for coping with the pressing challenges of the (long overdue) process of modernisation in the country. Thus, by tackling an issue of explosive force within the absolutist and still feudal political systems of early modern Spain, Huarte turns out to be very progressive. However, being progressive in one respect does not rule out his being equally conservative in other avenues of his thought. The coexistence of these two traits will prove to be markedly recurrent, notably in the economy of gender.

To illustrate this point further, I shall expose the conservative basis of the *Examen*: Huarte draws his arguments from bodily fluids. By the middle of the sixteenth century these paradigms of the philosophical and medical tradition of humoral pathology had culminated in an almost overwhelming system of different fluids. This over-elaborate system was coming under increasingly heavy criticism due to the influence of recently discovered Greek sources. As a consequence, new concepts had revised and simplified the four-fold humoral scheme, and displaced it with the idea of one vital sap. Such revisionary ideas soon spread across Europe and constituted a major step towards the "scientific revolution" that followed. Numbered among these "first of the moderns" (Bacon 1963, p. 114) was Bernardino Telesio, who rewrote his *De rerum natura iuxta propria principia* three times during the course of his life (1565, 1570, 1586) and maintained the *Accademia Consentina* in the Spanish dominion of Naples. His core concepts of two major principles, heat and cold, together with one transmitter fluid responsible for all vital processes formed the starting point for the convincing proto-feminist countermodel *Nueva filosofía de la naturaleza del hombre* (1587) developed by the female Spanish writer, Oliva Sabuco de Nantes y Barrera (see Bidwell-Steiner 2012). Interestingly, like Huarte, both of these innovative philosophical thinkers advance a materialistic explanatory model to reach far more gender-equitable conclusions.

So, why might Huarte have opted for a rather outdated medical model when convincing alternatives were readily available? My suggestion is that Huarte's principal interest, whether conscious or otherwise, was to choose an established system which could be corroborated by ancient authorities (such as Galen), as this best suited his *political* agenda. Had he focused on reforming the medical system, his examination of innovative contemporary models would have necessarily been more pronounced. Instead, he chose a medical foundation for his argument which would serve as the naturalisation of a new social order. In his contribution to a new technology of power, control over the female uterus became crucial, because this would be the breeding ground for new generations of well-tempered professionals. The fantasy echoes of Aristotle's conception of the womb as fertile soil culminate in the notorious chapter XV, where Huarte gives advice for ideal mating procedures. Although the above-mentioned alternative body-models by Telesio and Sabuco are also based on a strict materialistic epistemology, they do not aspire to such a stable naturalisation of living beings; instead their dynamic vision of human life allows a philogynist reconsideration of the patriarchal order.

I would argue that it is precisely because of this recognition of traditional ideas that Huarte's text became so successful. Familiar stereotypes in striking new clothes constituted a winning blend of conservative thought in progressive guise to persuade a wide and avid readership. Further scrutiny of the details of Huarte's argument can be teased-out from the above-cited quote.

By 1575 the Hippocratic concept of suffocation, in which the wandering uterus grasped the vital forces of other organs and so created all kinds of imbalances within the female body and soul, had already been refuted by physicians (for a history of hysteria as a female disease and the rôle of suffocation, see Rousseau 1993). But the rhetoric of analogy remained a common mindset of the time that offered direct evidence for a convincing political argument – one which was deeply rooted in the collective memory.

The conflation of woman with nature is a commonplace in Western philosophy. In older texts it works on a metaphorical level as is evident in the expression "Mother Nature" (one of the first philosophical references to it is in Plato's *Timaeus*). By contrast, Huarte's approximation of woman and sow is a radical, materialistic vulgarisation of Aristotle's rapprochement of women to animals in the so-called "chain of being".

Its argumentative surplus relies on the emphasis of the term *experiencia* since, by the end of the sixteenth century, the scientific *habitus* had adopted an increasingly empirical approach. But apart from such innovative elements, Huarte's words bring to mind another familiar metaphorical association: women as monsters (Creed 1993; Walker Bynum 2005). Such stark pictures tend to create a long-lasting echo.

3. Long-lasting monstrosities

Indeed, it was precisely these problematic ideas on gender and "race"³ that were picked up again more than a century later. In the history of ideas, Huarte's text is an important milestone in the naturalising and essentialising approaches to the human being. The tendency to arrange humans into neat categories would attract the particular attention of those idealists who favoured intellectual, and not hereditary, aristocracy.

It is not surprising, therefore, that none other than Gottfried Ephraim Lessing, one of the foremost German poets of the Enlightenment, revived interest in the *Examen de Ingenios* by translating it into German almost 200 years after the *editio princeps* had been issued (*Prüfung der Köpfe für die Wissenschaften*, 1752). As Heinrich Zankl (2004) points out, the interest in the screening of human differences provided for in Huarte's text coincides with the emergence of concepts on psychological typologies for individual and ethnic differences in the eighteenth century. Again, the construction of evidence does not rely on specific scientific innovation; instead, it shows a theoretical pluralism. A famous example would be Johann Caspar Lavater's physiognomy (*Physiognomische Fragmente zur Beförderung der Menschenkenntnis und Menschenliebe*, 1775-1778), an important link between the first two historical texts scrutinised in this investigation.

Physiognomy as a technique for reading the body has had its own vicissitudes in the history of thought. The Renaissance saw the emergence of some powerful models, such as Giambattista della Porta's *Della fisiognomia dell'huomo libri sei* (1613). However, according to Della Porta's approach, the signs on the body's surface are privileged in relation to the condition of the interior which they represent (see Kodera 2010, pp. 251-275). One could argue that the "signifier" rules

³ Of course, race as a genetic concept is of later origin, but the Spanish idea of *limpieza de sangre* (blood purity) can certainly be regarded as an important precursor.

out the “signified” because if these outward features, such as moles, can be removed, then their psychological equivalent disappears!

By contrast, the body readings of the eighteenth and nineteenth centuries, for which concepts like Huarte’s physio-psychology blazed a trail, considered body inscriptions as an unchangeable text, which determined the fate of its holder. The changing legibility of the interface between body and mind corresponded with the changing complexion of the social body under the circumstances of post-revolutionary Europe. Under the new dynamic, where stable hierarchies regulating horizontal and vertical lines of order were lacking, establishing binding norms became essential. In such a situation, Huarte’s fantasy of medical expertise as a source of power became reality, as Michel Foucault points out:

“Broadly speaking, we can say that modern expert opinion has replaced the mutual exclusion of medical and judicial discourses by a game that could be called the game of dual, medical and judicial, qualification. This practice, this technique of dual qualification, organized the realm of that very strange notion, ‘perversity’, that begins to emerge in the second half of the nineteenth century and that will ... authorize the appearance of a range of manifestly obsolete, laughable and puerile terms or elements in the discourse of experts who are justified as scientists ...” (Foucault 2003, pp. 32-33).

And it is precisely within this discourse that my second text for examining the construction of female deviance is embedded:

“La donna normale ha molti caratteri che l’avvicinano al selvaggio, al fanciullo e quindi al criminale (irosità, vendetta, gelosia, vanità), e altri diametralmente opposti che neutralizzano i primi, ma che la impediscono di avvicinarsi nella sua condotta quanto l’uomo a quell’equilibrio tra diritti e doveri, egoismo e altruismo, che è il termine dell’evoluzione morale”⁴ (Lombroso and Ferrero 1903, p. 157).

Cesare Lombroso’s further explanation helps us understand the appraisal of the two scholars who translated this text, *La donna delinquente*, stating that it “constitutes perhaps the most extended proof of women’s inferiority ever attempted” (Hahn Rafter and Gibson 2004, p. 32), since in the author’s view women remain bound to a dubious nature:

“La mancanza di potenza creatrice è definitivamente dimostrata dal fatto che le qualità più particolari della intelligenza femminile rivestono una forma spic-

⁴ “Normal woman has many characteristics that bring her close to the level of the savage, the child, and therefore the criminal (anger, revenge, jealousy, and vanity) and others, diametrically opposed, which neutralize the former. Yet her positive traits hinder her from rising to the level of man, whose behavior balances rights and duties, egotism, and altruism, and represents the peak of moral evolution” (Lombroso and Ferrero 2004, p. 81).

catamente automatica. Tale quella intuizione ... psicologica è un vero e proprio istinto, posseduto anche ... dai bambini e dagli animali, per es., dal cane”⁵ (Lombroso and Ferrero 1903, pp. 166, 169).

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So, the discursive revenants are back on stage: woman as animal and monster. However, this quotation is embedded in an altered, post-Cartesian, discourse: lacking any productive force and following mechanised principles, nature itself is downgraded. Therefore, to uncover the vested interest in the changed definition of the female we have to scrutinise its new wrapping. To conceive of its relevance in this specific discourse I will briefly expound on the making of the book.

Criminal Woman is a late text in an extremely successful series of books on positivist criminal anthropology, a school founded by Cesare Lombroso. In my opinion, their very sequence is revealing: Lombroso starts with an analysis on ethnic differences (*L'uomo bianco e l'uomo di colore*, 1871), before developing his doctrine on the criminal man (*L'uomo delinquente*, 1876) and, at the other extreme, the genius with his closeness to madness (*Genio e follia*, 1882); against this is set the criminal woman. The so-called “normal woman” is only a by-product found in the last text, categorised as an imaginary control group and traced as the necessary “other” to fix the tension between the defined peculiarities. But Lombroso’s “pathographic gaze” – to use a term with which Jutta Person has labeled his science (Person 2005) – generally focuses on the abnormal, the abhorrent and the perverted. As a matter of fact, reading and viewing the illustrations of the text, one is inclined to pathologise the author himself for his exposure of defenseless individuals.

Again, more nuanced conclusions require a consideration of the historical context. Lombroso’s motivation is best grasped when we trace his fantasy echoes, his identity-building in terms of “a designation of a set of psychic operations by which certain categories of identity are made to elide historical differences and create apparent continuities” (Scott 2001, p. 304). Lombroso was born in 1835, a period when the movement for the unification of Italy was in the ascendant. He grew up in a bourgeois Jewish family in the most progressive part of the peninsula, the Kingdom of Lombardy-Venetia, and placed all his expectations on the *risorgimento*. As a direct result, he volunteered as a doctor in

⁵ “Woman’s lack of creative power is definitively demonstrated by the distinctly automatic nature of her most typical form of intelligence. This is her intuition, which is ... psychological and a type of instinct; it also appears ... in children and in animals such as the dog” (Lombroso and Ferrero 2004, p. 85).

the new revolutionary force. Sent to the *mezzogiorno*, the Italian South, he was deeply shocked by the social and cultural backwardness of the region, and thereafter became obsessed with the idea of improving the physical and psychic condition of the future nation. Here again, we encounter a fervent reformer who despised the Establishment and the Church and embraced liberalism, socialism and new scientific paradigms.

His “lay faith”, as Hahn Rafter and Gibson (2004, p. 17) put it, became positivism, Darwinism and an eclectic assemblage of anthropometric and statistical methods. Let me offer a close reading of these dogmas focused on the above short citations. Darwin’s so-called theory of evolution comprises three basic elements: living beings have changed over a long period of time; evolution follows the principle of continuity (“*natura non facit saltus*”); evolution is progress understood as hereditary improvement.

One wonders whether Lombroso’s idea that the human male represented the “peak of evolution” (Lombroso and Ferrero 2004, p. 81) relied on positivist self-exploration. In fact, it corresponds with Darwin’s own theory that woman’s inferiority is the result of sexual selection (see Larson 2009). Other elements in Lombroso’s conceptualisation are a bizarre mingling of ideas from proponents of so-called social Darwinism. Despite all our fantasies of scientific progress by this era, some three hundred years after the Renaissance, we continue to discover intellectual frameworks founded on abstruse analogies. Without going into too much detail, I can sum up the relevant components. The British sociologist Herbert Spencer proposed an evolution of society analogous to the natural selection of biological organisms. Darwin’s cousin, Francis Galton, drew another analogy between physical and moral/intellectual evolution, and cautioned against the reproduction of less fit individuals. Meanwhile, the German scientist Ernst Haeckel provided the analogy between phylogenetic and ontogenetic evolutionary processes. In his disputed “recapitulation theory” Haeckel states that the human embryo progresses through all the evolutionary levels attained by the species – but in fast-forward, whilst in the womb.

Against this backdrop, a paradoxical element of *Criminal Woman* becomes intelligible – Lombroso’s awareness of an inner contradiction within his concept of criminal anthropology, as the inferior sex shows a lesser inclination towards crime:

“... e questo e l’atavismo e i prepotenti ardori maschili ci aiutano a comprendere come l’equivalente della reità-nata sia in esse, più che il delitto, la prostituzione,

che pure non dovrebbe sorgere, a filo di logica, in chi ai bisogni sessuali è tanto meno sensibile”⁶ (Lombroso and Ferrero 1903, Prefazione VII-VIII).

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In Lombroso’s typology of male criminals, atavism together with degenerative traits becomes the major explanatory model for criminal behaviour. Admitting that women show less tendency to revert to a primitive state (which is exactly what his paradigm of atavism means), helps Lombroso eliminate an obvious problem in his criminal anthropology; that is, if belonging to a lower evolutionary level indicates a higher inclination toward crime, why does the superior sex dominate all crime statistics?

The starting point of this circular reasoning is Darwin’s principle of sexual selection. Lombroso argues that among lower species and primitive people, women resemble men in physical and mental traits and in sexual activity. But throughout the evolutionary process males choose females for their appropriate qualities, linked to passivity, as represented by the “behaviour” of the female egg when penetrated by the active sperm. Therefore women become responsible for the species’ conservation whereas men’s role is variation. The passivity of women determines their inferiority although it corresponds to natural principles. An understanding of evolution could, then, explain women’s genetic closeness to the criminal through “men’s rapacious sexual desire”, as indicated in the quotation above.

But apart from a pedantic tendency toward completeness, why does Lombroso care about female delinquency if it is such a minor problem? The key is evident in his statement that the female criminal prototype is the “born prostitute”. This phantasm haunts his entire text. “Prostitute” here does not refer to sexual trade or business but to all sorts of promiscuous activities. Interestingly, none of the previous scholars who have studied the text seem to have noticed that this is the real contradictory aspect in Lombroso’s theory; if promiscuity does not remain a prerogative of men but is a genetic attribute of females, the theory of female passivity outlined above loses its logical base.

To better understand Lombroso’s obsessive attempts to come to terms with the phenomenon of the “prostitute”, I will now return to the social context of his writing. As Foucault points out with reference to Lombroso’s book on human genius:

⁶ “Women’s lesser criminality, their atavism, and men’s rapacious sexual desire help us to understand why women are less likely to be born criminals than born prostitutes. Logic alone could not lead one to this conclusion” (Lombroso and Ferrero 2004, p. 36).

"Lombroso, who was republican, anticlerical, positivist, and nationalist, sought to establish a discontinuity between, on the one hand, those movements he acknowledged, that is, in which he could recognize himself and which he saw as having been ratified by history, and, on the other, those contemporary movements that he opposed and sought to discredit" (Foucault 2003, p. 153).

The social movement Lombroso tried to exclude first of all was a set of subversive and anarchic tendencies in the Italian South that did not comply with his notion of the developing national state. But there was another alarming movement which intruded directly into Lombroso's personal environment: feminism. Feminism was Lombroso's real target, for one of his daughter's friends was the leading feminist and (in the moral climate of the time) rather libertine Anna Kuliscioff. Russian-born, Kuliscioff was a trained doctor and pursued a radical political and social agenda. The fact that she had been in prison several times underlines the personal nature of the connection to Lombroso's writing. In the text under consideration the deviance in the social body that had to be banned by pathologising its character is, therefore, the "women's movement".

As in the case of Huarte, the early modern physician in Spain, Lombroso developed his concepts by means of a mixture of signs that he read from the body, coupled with an explanatory system derived from an established scientific background. In circumstances not dissimilar to Huarte, Lombroso's theoretical framework had also been strenuously discussed and refuted before he ever published *Criminal Woman*. However, this antecedent refutation of his underlying theories did not prevent the book from becoming highly influential. As its English translators have pointed out: "No other study can rival *La donna delinquente* in its influence on subsequent thinking about women and crime" (Hahn Rafter and Gibson 2004, p. 31). Apparently, its impact on criminal psychology lasted until the 1970s. From my point of view, it would be naïve to assume that its impact was limited to the specific discipline of female criminality since a social norm is always defined by its outcasts. As Foucault remarks: "The problem now is how this technology of abnormality encountered other processes of normalization that were not concerned with crime, criminality, or monstrosity, but with something quite different: everyday sexuality" (Foucault 2003, p. 163).

We overcame humoral pathology, we overcame physiognomy, we overcame ontogenetic selection, but will we overcome desire for female deficiency? My answer to this question is not entirely optimistic. During an international conference dedicated to the topic "Gender & Science", I gained a glimpse of the new dress that enwraps the myth which devalues female identity and sexuality. The cognitive sciences belong to the few disciplines in academic research endowed with a great deal of money. With this funding they are gaining increasing power and significance on all manner of topics concerning the age-old discussion of nature versus nurture. The investigation of the "minor difference" in humans is intruding ever deeper into the body's interior. The focus is again shifting towards volatile matter such as neurotransmitters; it is neither the humours nor genes, but it could well be hormones which consign women to the second grade in another phantasmatic hierarchy of beings.

Traces of this development can be found in a recent text, the startling title of which is *Gehirn und Geschlecht* (edited by Lautenbacher, Güntürkün and Hausmann 2007; in English the title translates as: *Brain and Sex/Gender*). I have deliberately chosen an example from the field of cognitive research, a field which claims to adopt a multilayered approach to research and therefore is less susceptible to slanted positivist conclusions. Even so, from the opening pages the text draws up an odd definition of the English term gender: "Gender wurzelt in der Biologie, wird aber durch Umwelt und Erfahrung geformt"⁷ (Aloisi 2007, p. 4).

The book starts by presenting the biological roots of gender, namely hormones. The announced pluralistic approach, termed "psychobiosozialer Ansatz", is elaborated in the second main chapter dealing with psychic functions. Here, Markus Hausmann discusses differences in cognitive performance between men and women. But despite maintaining such a distinction, he qualifies his method right from the outset:

"Das bedeutet nicht, dass ein Geschlecht generell intelligenter ist als das andere, sondern dass es spezifische kognitive Funktionen gibt, in denen sich Frauen und Männer voneinander unterscheiden. Von vornherein sei dabei angemerkt, dass es sich hier nicht um absolute, sondern relative Leistungsunterschiede handelt.

⁷ "Gender is rooted in biology, but is shaped by environment and practice". All translations of the text are my own.

Die kognitiven Unterschiede innerhalb einer Geschlechtergruppe sind deutlich größer als zwischen den Geschlechtern”⁸ (Hausmann 2007, p. 106).

This quotation provides a clear presentation of the problem of Hausmann’s entire approach to research. It includes all the keywords which will feature in the following discourse – cognition, intelligence, men, women – but it fails to define them. And although we might agree with its cautious conclusion, in the broader context of the study it turns out to be a highly ambivalent strategy to support his rather essentialist argument.

The four differences postulated comprise spatial cognition, verbal cognition, speed of perception and motor skills. With reference to the first, Hausmann draws mainly on the so-called mental rotation test. Incidentally, his conclusion reinforces a commonplace: mental rotation shows the most robust differences in favour of men. He concedes a similar result for women with regard to verbal cognition, albeit to a far lesser degree of statistical significance. These differences between men and women turn out to be the major factual outcome. What follows is a circular argument reminiscent of the meandering rhetoric of early modern philosophical discourse. The author depicts several studies that endeavoured to eliminate some variables such as time pressure. These were obviously highly “contradictory”, as his extensive use of the subjunctive suggests. To give just one example: “Eine andere Studie lässt vermuten, dass der Faktor Zeit, vermittelt durch geschlechtsspezifische Lösungsstrategien, vielleicht doch einen Einfluss auf die Leistungsunterschiede in der mentalen Rotation nehmen könnte”⁹ (Hausmann 2007, p. 109).

The argument becomes even more diffuse because in the next stage Hausmann discusses another test for spatial skills, object location memory, where “eine Überlegenheit für Frauen beobachtet [wurde]”¹⁰ (Hausmann 2007, p. 109). Again, under slightly changed conditions the result is blurred. To explain his contradictory findings, the author once

⁸ “This does not mean, that one sex generally is more intelligent than the other, but that there are specific cognitive functions, in which women and men differ from each other. From the outset one has to consider that it is not a matter of absolute, but rather relative differences of achievement. Cognitive differences within one sex are significantly higher than between the sexes”.

⁹ “Another study ... implies the suggestion that the time factor, by means of gender/sex-specific solving strategies, could perhaps still exert an influence on the difference in achievement concerning mental rotation”.

¹⁰ “an advantage for women has been observed”.

more applies a presumptive style and – even worse – non-scientific commonplaces:

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“Diese Annahme passt auch zu der Beobachtung, dass sich Frauen eher an Landmarken orientieren ..., wohingegen Männer eher geometrische Informationen bei der Navigation einbeziehen ... Der klassische weibliche Vorteil in dieser Aufgabe zeigt sich nur dann, wenn konkrete Objekte verwendet werden, was vermutlich auf die weibliche Überlegenheit im verbalen Gedächtnis zurückgeführt werden kann. Ein männlicher Vorteil zeigt sich dagegen, wenn die Lokalisation abstrakter Objekte wiedergegeben werden muss, wobei vermutlich insbesondere räumliche Lösungsstrategien an Wirkung gewinnen”¹¹ (Hausmann 2007, p. 110).

Interestingly, in the next chapter the author challenges his own explanations when he states that verbal ability implies practically no real differences between women and men. A detailed discourse analysis of such passages in German reveals that the gender bias of the findings is reinforced by diction, as the discussion of male advantages is dominated by technical terms with Latin roots (“geometrisch”, “Navigation”, “Lokalisation”, “abstrakt” ...), whereas female advantages are explained in more demotic language. But this is not my major concern here. More revealing for a diachronic comparison in echoing gender differences is the reasoning about its causes (Hausmann 2007, pp. 114 ff.). Hausmann offers three parameters for his psycho-bio-social approach: brain structures, sexual hormonal influences, gender rôles and stereotypes.

Aspects which show some promise for a more gender-equal science turn out to be rather limited. Already sexual dimorphism in the brain is explained by sex hormones, which take up the largest part of the possible causes for gender difference. The title “Geschlechterrollen und Geschlechtsstereotypen” deals solely with the so-called “stereotype threat”, that is, the experience that people belonging to negative stereotype groups perform worse. Hence, the fairly basic hypothesis that the highly-discussed cultural phenomenon of public space as the male sphere and private space as the female sphere could explain the superior spatial capacity of men remains unexplored and unchallenged. Gender sociology provides a lot of data for the fact that this historical segregation

¹¹ “This hypothesis fits with the observation that women tend to orient themselves with respect to landmarks ... while men tend to include geometric information to navigate ... The classic female advantage in this task only shows if concrete objects are involved, which presumably could be ascribed to female superiority in verbal memory. In contrast, a male advantage shows if the location of abstract objects has to be reproduced, in which presumably spatial solution strategies gain efficiency”.

is reproduced in childhood behaviour with boys occupying much more space in playing grounds than girls, but these well-documented findings do not provide satisfactory explanation for the author.

Hausmann's focus clearly lies in hormonal influence, in which he distinguishes between "organising hormone" effects and "activating hormone" effects. He postulates that organising hormones determine sexual differences in cognition. To corroborate this, he elaborates on diseases which show an unusual concentration of sexual hormones like congenital adrenal hyperplasia (CAH). The term covers a set of autosomal recessive diseases caused by a gene mutation which involves higher activity of the adrenal glands. Hausmann quotes studies with CAH-girls exhibiting extraordinary intelligence. But what exactly are CAH-girls?

"Bei Mädchen führt CAH zu einer Vermännlichung des Genitales, was das erste Anzeichen für diese Störung ist und gewöhnlich sehr früh chirurgisch korrigiert wird. Durch eine korrigierende Hormontherapie wird die exzessive Androgensekretion gestoppt. Im Idealfall sind die Androgenspiegel nur vor und kurz nach der Geburt erhöht, so dass ihre Wirkung auf mentale Fähigkeiten im späteren Leben mit größter Wahrscheinlichkeit durch den hormonellen Einfluss während eines zeitlich begrenzten frühen Zeitraumes bedingt ist"¹² (Hausmann 2007, p. 116).

What makes these babies into girls and why are they subjected to "correction"? Given the fact that the situation described is the very process of birth, the designation of the newborn as "girl" appears highly problematic and its "correction" should rather be termed "normalisation". But one might argue that, notwithstanding such a normalisation procedure, these corrected girls are enhanced girls, because according to Hausmann's presentation of such studies their spatial abilities are higher and: "Es handelt sich hierbei um die gleichen räumlichen Tests, in denen Männer durchschnittlich besser abschneiden als Frauen"¹³ (Hausmann 2007, p. 116).

In the following passage the author admits that the results might correlate with the fact that CAH-girls are often raised as boys due to their parents' uncertainty as to their genetic sex. But then he cites another study that compared CAH-girls to "coeval sane [!] boys" with

¹² "CAH in girls causes the masculinisation of the genitals, which is the first sign of this defect and is usually corrected very early by surgery. Through corrective hormone therapy the excessive secretion of androgen is stopped. Ideally, the levels of androgen are raised only before and shortly after birth, with the result that any effect on mental abilities in later life are caused, with the utmost probability, by the hormonal influence during a temporary, limited earlier period".

¹³ "These are the very same spatial tests, in which men on average perform better than women".

the result that the two groups showed similar preferences for “typical boy’s toys”. The analysis thus reads: “Die beiden Wissenschaftlerinnen sehen dieses Ergebnis als deutlichen Hinweis darauf, dass die frühe hormonelle Umwelt bei Mädchen einen ‘vermännlichenden’ Effekt auf die Präferenz geschlechtsspezifischen Spielzeugs haben und so die kognitive Entwicklung geschlechtsspezifisch beeinflussen kann”¹⁴ (Hausmann 2007, p. 116).

Once more, to avoid the obvious under-determination of his research setting, the author could have availed himself of feminist sources, such as Sandra Harding, Nelly Oudshoorn and Anne Fausto-Sterling, to name but a few. In this case the negligence of alternative models is much more telling than in the historical examples, because the very topic of Hausmann’s text is gender/sex. Fausto-Sterling’s groundbreaking book, *Sexing the Body: Gender Politics and the Construction of Sexuality* (2000), not only suggests a much more sophisticated multilayered approach to investigating the sexed and gendered body, it also deconstructs some of the studies which Hausmann highlights as important to understanding differences between the sexes. The US biologist reveals her ambivalence and dependence on the investigator’s personal beliefs and frameworks when it comes to CAH-girls, albeit without defying their definition as girls (Fausto-Sterling 2000, pp. 72-75, cf. Oudshoorn 1994).

What is crucial for any gender-sensitive physiology is that Fausto-Sterling challenges the very labeling of the sex hormones: “Yet despite the fact that both hormones seem to pop up in all types of bodies, producing all sorts of different effects, many reporters and researchers continue to consider estrogen the female hormone and testosterone the male hormone ... Why not redefine these molecules as the ubiquitous and powerful growth hormones they are?” (Fausto-Sterling 2000, p. 179).

The discipline of endocrinology is inscribed by a powerful and problematic ideology of antagonisms – antagonisms of race, class and gender (Fausto-Sterling 2000, pp. 155-160). But instead of confronting the outlined findings with their possibly problematic heritage, Hausmann shifts the discussion to a moderating discourse in which he presents studies that relativise the starting point. All the more surprising, in his summary he comes full circle by stating: “die Geschlechterforschung der letzten Jahrzehnte [zeigt] eindeutig, dass sich Frauen und Männer

¹⁴ “The two researchers consider this result as a clear indicator that the early hormonal environment yielded a masculinising effect on girls, in their preference for gender-specific toys, and therefore influenced their cognitive development in a gender-specific way”.

in bestimmten kognitiven Fähigkeiten unterscheiden”¹⁵ (Hausmann 2007, p. 121). I would never have drawn such a conclusion from the contradictory material presented, the vague inferences from statistical data, and the prevalent subjunctive case of the verbs.

As is all too often the case, while addressing differences between men and women, the subtext informs us about female deficiency. I hope to have shown that the only feature that Hausmann tags as “robuste Geschlechtsunterschiede” is mental rotation and – “quite surprisingly” – the difference identifies an advantage for male mental performance. Consequently, most of the following argumentation treats or refers to this basic statement, although there are other investigations refuting such differences. Once more, the alleged robustness of the finding is constructed on the basis of the reiteration of a partial argument and the strategy of begging the question. If we read the text at face value, the enduring impression is one of female inferiority.

5. How to undo science?

Confronted with the continuous recurrence of female deficiency, one suspects the existence of a hormone promoting misogyny! But it might be more revealing to revisit the tool of “fantasy echoes” to better understand the coherence between the three selected texts in their construction of sexual difference.

The enduring collective fantasy in our culture is the male civil subject, or in Jacques Lacan’s words, the phallic meta-signifier. It is all the more potent because it is a phantasma and therefore remains dependent on being reflected in the “other”. Its void has to be secured by the “other”, which in itself is also a bare signifier. Thus, Echo has to endow it with perpetually new clothes. The texture of these clothes can be captured by the intersectional categories of race, class and gender. But why does the gender construct prove the strongest “other”? The enduring matrix behind all these fantasies, stripped of its changing garments, remains what it is: the uterus. Its history of *longue durée* is – as G.S. Rousseau puts it – a “his-story” of male fear (Rousseau 1993, p. 94).

¹⁵ “Gender [or sex?] studies in recent decades have definitely shown that women and men differ in specific cognitive skills”.

The more its fantastic narrative patterns are traced and refuted, the more it moves toward invisible and unreachable areas such as the brain. While our collective experience becomes more and more pluralistic, the scientific disciplines are simultaneously reinforcing their specialisation. In other words, there are many more examples of “undoing gender” in everyday life than in science. As the comparison of material from different epochs shows, a rigid gender bias can easily be integrated into entirely different “impartial” scientific paradigms, be it humours, genes or hormones. In all the case studies presented in this article, the degradation of women moves in tandem with a distinct impetus for reform. Stabilising the gender hierarchy almost seems to be the price for reforms in other areas. Even in today’s secular world, science still seems to create its own metaphysics. So, how can we “undo science” in a gender-balanced way? What becomes more evident by adopting a historical lens is that uncovering the narrative and unscientific ground of a specific gender-stereotyped conception may help to refute such a model. It does not necessarily entail a general sensitivity to rhetorical constructions and underlying blind spots as such. Feminist science critiques are very effective in tracing slanted outlines in already completed studies, but they cannot anticipate wrong or partial outlines for ongoing scientific inquiry. Hence, interference could, perhaps, be an effective first step for undoing science. Every scientific project should be “disturbed” by intersectional social and cultural research from the very beginning. I deliberately choose this provocative verb to point out the fact that interdisciplinary intersectional cooperation is expensive, strenuous and slow. It has much more to do with polluting “pure” scientific discourses than with catchy labels. But it might pay back. Instead of deciphering distorted fantasy echoes, we could help by developing more significant questions. We are now perfectly able to describe the different fabrics of womanliness, whereas undoing science might equip us with an effective means to contest difference.

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III.

GOING BEYOND THE WESTERN CONTEXT?

Postcolonialism and Science: Gender Issues

Sandra Harding

1. Introduction

The fields of gender studies and postcolonial studies both emerged in the 1960s and 70s, though each had earlier origins¹. Each was slower to focus on the natural sciences and engineering, though once started, this work rapidly began to flourish. In the case of postcolonial science and technology studies, it was concerns about national science and technology policy, including education policy, that motivated the earliest work (Goonatilake 1984; Nandy 1983, 1990; Pettijean, Jami and Moulin 1992; Sardar 1988; Waast 1996). Third World science and technology intellectuals (and their Western allies), often supported by UNESCO, asked what kinds of sciences and technologies should the newly independent states support? Only the kinds that their European colonial rulers had favoured, and that all too often distributed few benefits and many costs to the colonised? What could be the alternatives? What should be prioritised in rethinking the value of their own scientific and technological legacies?

There were only a few women among these early postcolonial science and technology intellectuals. Yet they made clear to their colleagues that women's interests were not always identical with men's, and that women's concerns needed direct attention also – a point well-understood from the beginnings of women's movements more generally (Shiva 1989; Gender Working Group 1995; Gender, Technology and Development 1998 ff.). Today, some four decades after these social movements emerged, both thinking about gender issues in postcolonial science and technology studies and about postcolonial issues in Western

¹ Earlier forms of my argument here appear in my 2009 publication under the title *Postcolonial and Feminist Philosophies of Science and Technology* and in the second half of my introduction to 2011.

gender science and technology studies are still in their long infancies. It still seems permissible for each of these science and technology movements to ignore the work of the other. Each has developed one or more robust research agendas which in fact discourage closer intellectual and policy thinking. These research and policy agendas conflict. I suggest that these divergences are neither accidental nor always the result of overt hostility to the interests of the other social movement (though of course one cannot completely dismiss the effects of disinterest among dominant groups in the interests of the dominated). Rather, the two science and technology movements, from their origins, have made conflicting assumptions about at least three key issues: what are the relevant social relations, the relevant sciences and who are the imagined agents of progressive social transformation? Here I briefly describe these conflicting assumptions, and point to just one of the great achievements of each from which the other movement could also benefit. I begin by contrasting two ways in which these movements' interests are complementary.

2. Complementary agendas

The agendas of feminist and postcolonial science and technology studies are similar in important respects and thus would seem to be complementary. For example, both argue that the perspectives and interests of their particular constituencies are not well-served by modern Western science and technology policies, practices or philosophies. To be sure, modern Western policies, practices and philosophies of science and technology have delivered some benefits to some women in the West, but mostly to those already economically and politically advantaged. Nevertheless, these sciences and technologies were rarely designed to respond to any gender differing needs and desires of women in the West, let alone to the needs and desires – gender distinctive or not – of women in different classes, races, ethnicities and cultural groups around the globe. Nor have they usually been designed to respond to the needs and desires of non-Westerners, with the exception of the upper classes around the globe who are already economically and politically well-resourced. Rather, modern Western sciences have been planned to respond primarily to the needs of Western states, militaries and corporations, from the design and management of which women and representatives of poor people around the globe have been systematically excluded. Women (as well as most men) around the globe have

had to bear disproportionate shares of the costs and relatively fewer of the benefits of modern Western sciences and technologies. Another similarity is that both science and technology movements offer alternatives that they claim are grounded in more realistic understandings of knowledge production processes, are more comprehensive, and can better serve the peoples on behalf of whom each speaks. However, third, (with rare exceptions) neither science and technology movement wants to abandon modern Western sciences completely. Rather, each wants to design them to address different issues, in different ways than before. Thus the respective agendas are always explicitly political as well as intellectual. In such ways, the agendas of the two science and technology movements are complementary to each other.

However, this is only a weak complementary. Additional reasons for each to be interested in the projects of the other arise from the recognition that their constituencies are overlapping and their discourses are interlocked. At least half of the ex-colonised and those still under the control of neocolonialism and neoimperialism are women. And the vast majority of women in the world are not in the West. Moreover, children, the elderly, disabled and sick people all depend upon women for their daily survival. Thus a huge majority of the world's women and their dependents belong to ex-colonised peoples and those now negatively impacted by residues and resurrections of colonialism and imperialism, and a huge majority of the latter are women and their dependents.

Furthermore, the dominant discourses that these social movements criticise, as well as the ones they themselves use, are deeply imbricated or locked into each other: colonialism, imperialism and male supremacy have persistently represented gender in racial or colonial terms and racial and colonial relations in gender terms (e.g. Stepan 1986). In these colonial and male supremacist discourses, women supposedly are not fully civilised and non-Western men are supposedly not as masculine as men of European descent. Neither are they regarded as capable of managing their own lives as well as are men of European descent, according to such assumptions. Gender and racial/colonial categories still co-constitute each other today (Crenshaw 1995; Scott 1995). Thus because of their overlapping constituencies and interlocking discourses, each of these science and technology movements would seem to have to depend on the successes of the other in order to achieve its own professed goals. In this sense they are "strongly complementary".

Yet these two science and technology movements often seem committed to conflicting assumptions about the relevant social relations,

the relevant sciences, and questions of who can and should be agents of the kinds of radical social and scientific change for which each calls (there are important exceptions to this charge, as we will see). Under such circumstances, neither social movement can deliver the benefits it envisions to the majority of those to whom it has professed accountability. Before we turn to this issue, it is worthwhile to recollect just what “gender” is and is not, including in feminist science and technology studies. In feminist work, the term “gender” is used in ways that may not be obvious. I shall also provide a brief overview of main themes in postcolonial science and technology studies.

3. Gender in science studies

Gender is not another word for women, contrary to widespread popular usage. Rather, like class and race it designates particular kinds of social relations, here between men and women as well as between men and between women. These relations are “made, not born”, to borrow from Simone de Beauvoir’s famous observation. Moreover, gender relations are manifested not only by individuals but also in the structures and systematic practices of institutions (e.g. job classifications, legal regulations). They also appear in our symbolic systems, our meanings, as when nations are represented as women (Liberty, Columbia, Marianne) or when regulative ideals of research, such as objectivity and rationality, are represented as a distinctively masculine achievement. Furthermore, gender relations organise hierarchical institutional structures of economic, political and social power. However, gender never functions alone; it always interacts with other powerful social relations, such as race and class. Whether one conceptualises such interactions as intersections or as processes of co-constitution, gender relations are always historically dynamic. They change over time, and a change in one such hierarchical relation affects the others with which it is interlocked. Finally, like race and class, gender is both a descriptive and an analytic term. It designates both something “out there” in social relations and also a kind of analytic framework invoked to explain diverse manifestations of such social relations².

² I first distinguished gender in these ways in my 1986, pp. 52-56. Two further comments. First, the insistence on separating the social gender differences so firmly from the biological relations of sex differences may well be on shaky ground. This is not because biological reductionism was right (it was not), but because the binary of gender vs. sex is a form of the culture vs. nature binary that has come under severe criticism in several branches of biology (Fausto-Sterling 2005;

Feminist science studies are by now four decades old. I shall not here review that history except to name focuses of ongoing concern in the North, as well as everywhere Northern sciences have found a home in the South (though there are additional gender issues in the South, as we shall see). Such projects have been initiated by groups with different kinds of disciplinary, political and institutional interests in scientific and technological research. One such question is: where are (and have been) women in the social structures of modern sciences, and why have there been so few of them in the arenas of the design and management of research? Another is how and why have “sexist sciences” provided empirical support for the claimed inferiority of women and superiority of men? A third one asks how technologies and the applications of the results of scientific research have been limited in ways that maintain male supremacy and women’s inequality. Women’s health, reproductive and environmental concerns were among the earliest such focuses here. Fourth, how do scientific and technical education – pedagogy and curricula – restrict girls’ and women’s (and boys’) development as scientists and engineers?³ Finally, what is problematic about the epistemologies, methodologies and philosophies of science that produce and support such sexist and androcentric practices?⁴

Such are still important almost four decades after they were first posed – unfortunately! In some areas significant progress has been made: for example, women’s access to scientific educations, publications, organisations and lab and classroom jobs has increased, and today we

Keller 2010). Moreover, this latter binary is no longer legitimate in science studies where cultures and their concepts of nature are seen as co-constituting each other (Jasanoff 2004). Nor do other cultures’ knowledge systems tend to find it appropriate. The solution is to be found in inventing a new kind of biology that does not depend on such a severe separation between the social and the natural, but this we do not yet have. Second, it is also worth thinking about the effects of transgender and transsexuality theories and practices on ways of analysing gender differences (Valentine 2007).

³ These studies can appear to be focused only on women, but they always have been concerned with how economic, political and social gender inequality unfairly limited women’s interactions with sciences and technologies while overadvantaging men’s interactions, and with how women resisted such discrimination. It is not so much men that are perceived to be the problem for women. Rather the social institutions that exclusively men have designed and managed do not well serve women’s interests and desires.

⁴ Examples of this relatively early work include: Boston Women’s Health Collective 1970; Fausto-Sterling 1994; Haraway 1989; Harding 1986, 1991; Harding and Hintikka 2003²; Hubbard, Henifin and Fried 1982; Keller 1984; Longino 1990; Merchant 1980; Rossiter 1982, 1995; Schiebinger 1989, 1993; Tobach and Rosoff 1978-1984; Wajcman 1995. Of course the medical establishment’s disparaging and often erroneous opinions about women’s bodies were the object of much early gender and science work. For recent reviews of these issues see “Women as Subjects of History and Knowledge”, Chapter 4 of Harding 2008, and Subramaniam 2009.

find at least a token presence of women in policy contexts. Moreover, significant changes in health and reproductive policies have occurred for women in already advantaged groups. As we will see, some feminist epistemological and methodological work has enabled new kinds of increasingly widespread debates about the relation of different human experiences to the production of knowledge. Yet women in Africa, Asia and other places around the globe, as well as poor women in the West, have not much benefitted from these kinds of progress.

However, neither postcolonial nor Northern feminist science and technology studies are likely to improve women's conditions as long as their fundamental assumptions conflict. From the perspective of Northern labs, science curricula and federal policy, it is all too easy to be unaware of how Northern sciences and technologies function globally. In none of such contexts can one easily focus on postcolonial or gendered social relations, indigenous knowledge or feminist research innovations, or the possibility that Northern residents, men or women, probably will not be the most valuable agents of democratic social change in science and technology worlds.

4. Postcolonial science and technology studies

Four themes will serve to delineate a central range of interests in this field (Harding 2011). First, both Western and non-Western historians have argued for counter-histories of modern Western sciences that examine the contributions these sciences made to European colonialism and imperialism as well as the effects of the latter on the institutions, policies, practices and philosophies of modern Western sciences. Second, along with anthropologists and scientists from both Western and non-Western cultures, these historians have also looked at the interactions between different cultures' sciences and they have organised reevaluations of the strengths of non-Western knowledge traditions. While Westerners conventionally have characterised other cultures' knowledge systems as entirely mystic, magic and superstitious, these first two kinds of studies "level the playing field" by showing how modern Western sciences also include a fair share of myth, magic and superstition, while the non-Western systems are often empirically reliable in their intended ranges of phenomena.

A third theme identifies residues and reconstructions of colonial and imperial features of both Western and non-Western scientific institu-

tions, practices and philosophies – often in spite of the counter-intentions of the scientists themselves. A fourth theme is forward-looking, asking what kinds of changes are necessary and possible in Western and non-Western scientific and technological agendas and practices, and in the relations between them.

Most importantly, these analyses make clear that postcolonial science and technology studies are no less about us in the modern West than about other cultures around the globe (just as gender studies are about men and their institutions, too). And they insist that studies of globalisation, important as they are, cannot replace a direct confrontation with issues about the past, the present and the future that are centred in postcolonial accounts (Anderson 2009).

Now we are ready to ask what these conflicting assumptions made by feminist and postcolonial science and technology studies actually are.

5. Theoretical and methodological sites of dissonance

a. What are the relevant social relations?

First, what are the relevant social relations to be examined for these two kinds of science and technology studies? Male postcolonial science and technology scholars rarely regard gender relations as relevant either to the actual situations they observe around the globe or to their own theoretical or empirical practices. Similarly, far too few Western feminists have considered colonial or postcolonial science and technology relations as relevant to their arguments about women, science and technology, as indicated earlier. The exceptions here can primarily be found in the long history of criticisms of science and technology aspects of development policies and practices and in environmental studies (Gender, Technology and Development 1998 ff.; Seager 1993).

More than three decades ago, historians pointed out that recognising women to be fully human – as fully human as their brothers – undermines traditional theoretical and methodological assumptions about social relations. This recognition raises provocative questions. For example, how should we account for the fact that women's conditions have tended to regress at precisely the moments marked in conventional histories as highpoints of "human progress", such as the Renaissance, or the state formation resulting in Athenian democracy and, more than two millennia later, the United States? Even worse, it turns out

that it was precisely because of the features identified as progressive that women's lives regressed. This is because whatever is extolled as progressive tends to be symbolised as virile and manly in societies structured by gender hierarchy. For example, it was not an accident that in the Renaissance women lost rights and opportunities they had earlier possessed. Moreover in state formation women invariably lost legal and political rights they had possessed in earlier periods, including in the democratic revolutions of eighteenth-century Europe and the independence movements of newly postcolonial states after World War II (Kelly-Gadol 1976; Pateman 1988; Scott 1995). Conventional theories of social change have apparently failed to account for the transformations they intend to chart insofar as they ignore women's role and fate in such processes. It has become clear that chronologies grounded only in what happened in men's lives, whether about the North or the South, have left no conceptual space for significant changes in women's lives or for examining the effects that the conditions of women's and men's lives have had on each other.

Yet postcolonial science and technology studies seem to assume that women and men benefit equally from men's progress, and that gender relations are irrelevant to the most adequate theories of social change. With important exceptions, the relevant social relations in the postcolonial accounts are those of presumably gender-free imperialism, colonialism, nation-building and the local apparently gender-free acquiescence of or resistance to such processes. Occasional references to "women's concerns" do not address gendered social structures or symbolic practices, let alone feminist epistemological, methodological or philosophy of science issues. Consequently, postcolonial theory cannot understand colonial, imperial, postcolonial or today's neocolonial and neoimperial processes as long as its assumptions obscure women's realities and experiences, their standpoints on dominant social relations and the gender relations that structure and give meaning to social institutions and the men's and women's lives lived within them.

It is encouraging to see that a few historians and ethnographers have begun to identify the gendered symbolic meanings and accompanying practices that have shaped Western sciences and technologies in colonial and imperial projects. For example, they have focused on scientists' claims that the greatest scientific value should go to the discoveries and inventions produced through the manly heroism of scientific quests (Terrall 1998), on the gender, class and colonial structure of Jesuit scientific communities in their overseas missions (Harris 2005; Rhodes

2005), on the masculine chivalric values of the knowledge gathering of Spanish conquistadors as well as British and French colonialists (Canizares-Esguerra 2005) and on the application of gender stereotypes to colonial relations in typical British representations of fitness and disease in the colonies (Harrison 2005). This is an area ripe for further exploration.

In a parallel way, much Western feminist work only rarely sees the social relations of colonialism and imperialism as having anything to do with women's or men's experiences of Western scientific and technological work. These scholars seem to think that as long as they are focused only on Western women and gender relations, social relations of colonialism and imperialism are irrelevant to the nature and practices of the sciences and technologies they observe. Such assumptions leave us all ignorant of both the history and practices of sciences and technologies around the globe and of women's and men's variable participation in and experiences of such histories and practices. Thus similar arguments about treating non-Westerners as fully human reveal the limitations of traditional Eurocentric methodology in Western feminist science and technology studies – one that is shared, for the most part, with the larger field of the social studies of science, that is the histories, sociologies, ethnographies and political economies of mostly modern Western sciences. Each field ignores powerful kinds of social relations that have shaped the content of sciences and technologies.

b. *What are the relevant sciences?*

A second site of dissonance is the question of what are the relevant sciences for these two kinds of studies. For Western feminists (like Western science studies more generally), these have been almost entirely modern Western ones⁵. Courageous and brilliant work has been accomplished here in addressing the gender dimensions even of the sciences thought least susceptible to social fingerprints, such as physics and chemistry (Keller 1984; Potter 2001; Traweek 1988). Yet the history of modern Western sciences and analyses of their practices today are almost never set in the context of the history of Western appropriation of significant achievements of other cultures' sciences and technologies, or of their destruction through the West. Indigenous knowledge traditions, whether in the West or elsewhere mainly seem to be beyond the

⁵ See, for example, the otherwise excellent, widely-used reader for courses in gender and science studies, Wyer et al. 2001.

horizons of most of this work. Western feminist work, like much of the larger science studies movement which has partially shaped it, is unaware of the counter-histories, the successes of indigenous knowledge or the arguments for valuing multiple science traditions – a world of sciences. These kinds of studies call for radically rethinking conventional Western assumptions about scientific rationality and technical expertise. Consequently, the view of modern Western sciences and technologies from the standpoint of non-Western societies is also missing from Western feminist science and technology studies⁶.

A major obstacle to the Western appreciation of non-Western science and technology traditions is the fact that the latter are always embedded in local cultural assumptions and projects, usually including (always?) religious and spiritual ones. Western sciences have prided themselves on their secular character, favouring no particular religious or cultural commitments as they proclaim, but only reporting the bare facts of nature's regularities and underlying causal tendencies. Modern Western science is transparent to nature, adding nothing that is not already "out there". After all, this value neutrality is what makes these sciences so desirable around the globe and so capable of effectively interacting with the natural worlds that every culture encounters. Yet a lively discussion on the limits of Western secularism has recently emerged among researchers and scholars around the globe. A central issue in this context are assertions that, on the one hand, modern Western secularism is in fact deeply embedded in Christian and, in particular, Protestant assumptions. Thus if we do want to think of it as secular, it is so in a distinctively Western way that does not completely screen out Christian and Protestant assumptions. On the other hand, the West seems peculiarly resistant to tolerating the increased presence of Muslims and Islam in the ways it has at least officially "tolerated" Catholics, Protestants and Jews⁷. Moreover, the secularisms of both Western and non-Western cultures are multiple, taking different forms in different historical and social contexts. Finally, the religious commitments of other cultures' sciences usually do not seem to damage the reliability of their understandings of nature's regularities. This is too complex a topic to be pursued further here, but it is an important

⁶ My argument is not that the feminist theorists themselves are completely unaware of these matters but rather that the theoretical and methodological frameworks that they deploy obscure or marginalise such issues.

⁷ Of course there are plenty of examples even very recently where hostilities are evident between Catholics and Protestants and toward Jews.

one for people interested in designing science policies for multicultural democracies⁸.

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For postcolonial scholars, indigenous traditions, critical perspectives on modern Western sciences and the design of science and technology policies and practices that integrate the best of both worlds are central projects. They have produced diverse evaluations of these different traditions and accounts of possible future relations between indigenous and modern Western scientific knowledge systems (e.g. Denzin, Lincoln and Smith 2008; Goonatilake 1984; Hess 1995; Hoppers 2002; Nader 1996; Third World Network 1993; Turnbull 2000; Watson-Verran and Turnbull 1995). Yet there has been very little focus on women's domains of producing knowledge in these accounts of indigenous knowledge, nor awareness of the different kinds of experiences women have had (different in different cultural contexts, but also different from men's experiences in these contexts) which have informed Western feminist innovative methodological and epistemological strategies. Nor have they grasped the limitations of their own analyses or recommendations from the standpoint of women's interests. They have not treated women, their needs, interests and insights as fully human, nor have they considered them as equally crucial to social progress as they consider their own. Often feminism is perceived by men in ex-colonised societies as a Western import. In these cases resistance to it is perceived to be an important part of resistance to Western imperialism. And this is so in spite of often vigorous and innovative feminist movements locally created by their female colleagues and compatriots. Evidently these otherwise brilliant intellectuals and activists take women to be more easily duped by the West than are men!⁹

c. *Who are the relevant agents of progressive social transformation?*

Finally, the feminist and postcolonial accounts disagree on questions of who can and should be the agents of progressive transformations of societies and their sciences. Neither movement seems to deem it

⁸ These arguments and more can be found in, for example, Calhoun, Warner and Van Antwerpen 2007; Jakobsen and Pellegrini 2008; Levey and Madood 2009.

⁹ Of course I am a bit disingenuous here. Men in every society have resisted giving up their gender privileges. They usually mask their interests in male supremacy with arguments about the trivial or dangerous nature of any challenges to their control over women's lives. This is so even when they have good reasons to resist continued Western intrusions in their societies. Arriving at the best strategies for overcoming inequalities at least requires a lot of public dialogue between all of the relevant stakeholders.

necessary to centre members of the other group in the envisioned design and management of its projects. Only a few women, e.g., Donna Haraway and Vandana Shiva, appear in the citations of contemporary postcolonial science studies scholars, and these are mostly the same few who occasionally appear in the feminist work¹⁰. The standpoint of women only rarely makes an appearance in this postcolonial work. Similarly, the standpoint of poor people in the Third World is missing in many Northern feminist analyses. Moreover, non-Western peoples do not appear as the designers or leaders of radical political and intellectual transformation in most Western feminist work. The others' voices are hardly ever heard or reported except occasionally as special interests. That is, the others are never represented as at the forefront in conceptualising or leading social action toward goals and strategies that will produce widespread benefits, including but not limited to those purportedly special interest groups themselves¹¹.

Neither movement can deliver social progress to its professed constituencies without attention to the full range of issues addressed by both postcolonial and feminist science and technology studies. The existing separation of these two powerful conceptual frameworks must be ended.

6. A world of sciences?

Of the many achievements of postcolonial science studies, one is especially relevant here. This is the conception of a world of sciences; that is of multiple functioning sciences, each with culturally distinctive projects and achievements. Because they are constituted in different natural and social environments, they can tend to make different assumptions about nature and social relations. These will sometimes be in conflict with each other. Conventional Western epistemologies would find this situation intolerable, and insist on strategies to unify these sciences. While unification strategies can be valuable in some contexts, in others they are not. Western science studies themselves have produced several

¹⁰ Though many more appear in the larger field of postcolonial studies. There are also many additional significant postcolonial feminist science and technology scholars working in the West and around the world.

¹¹ Of course poor people and grass roots activists from around the globe tend to have what they understandably see as more urgent projects than to write essays or books to be published in the West. But there are lots of other ways for their voices to be heard in the West.

accounts describing and justifying a world of multiple Western sciences (Galison and Stump 1996; Kellert, Longino and Waters 2006). The editors of the Kellert volume argue that the plurality of sciences must be an empirical matter, not an *a priori* assumption or a manifesto. Yet they provide powerful reasons to find compelling a world of sciences. They point out that nature itself is too complex and too indeterminate to permit settling on a unified account of its regularities and underlying causal tendencies. Moreover, human interests are too varied to settle for only one coherent set of descriptions and explanations of nature's order (see Dupré 1993). If this is really the case within the world of modern Western sciences, it is hard to see what could justify excluding non-Western sciences from such an understanding of the advantages and reasonableness of scientific pluralism.

How should conflicts between such knowledge systems be settled? Five strategies are suggested in the postcolonial writings. In one, modern Western sciences appropriate what they claim from the non-Western ones to create a coherent world knowledge system. In a second, the non-Western sciences “delink” from the West to give themselves the space to critically examine and modernise their traditional knowledge systems for today's needs. In a third policy, the non-Western sciences adopt what they individually select from modern Western sciences into their modernised traditional knowledge systems. A fourth relation is for the West to take certain features of non-Western sciences as models for transforming our own sciences. For example, many colonised cultures, such as elites in India during the two-century British occupation of India, have already learned to use two or more medical/health systems that conflict with each other in significant ways. Finally, a fifth possibility is to design cooperative scientific projects that draw on strengths of both modern Western and indigenous knowledge traditions¹². Obviously, each of these kinds of relations between Western and non-Western sciences has its advantages and disadvantages. And each raises further intriguing questions which cannot be pursued here.

My own view is that all of these kinds of relations are already underway, and all will continue to flourish. It would be a mistake to think we should in principle choose between them as a policy. Yet I think it would be tragic if the first one were completely successful and we bequeathed to generations to come just one “science of everything” that

¹² I have discussed these at greater length in several places. See, for example, Chapters 5 and 7 of my 2008.

had vanquished all conflicting competitors. If it were even possible to achieve, it would create a massive impoverishment of human knowledge production for the reasons articulated above by Kellert, Longino and Waters (2006). Nature is too complex and indeterminate, and human curiosity too boundless, to settle for only one coherent set of knowledge claims about nature and social relations. Rather, we could learn to see the advantages of a world of sciences, partially overlapping, partially conflicting and always under revision.

7. Standpoint methodology

This way of designing and conducting research projects has been most extensively theorised with respect to gender issues, even though its logic usually is invoked also in postcolonial accounts as it is in many other social justice research projects (Harding 2004). The concept of a methodological standpoint arose in Marxian writings about the importance of taking the “standpoint of the proletariat” to understand how capitalism actually worked, contrary to the bourgeoisie’s continual justification of the necessity of exploiting manual labourers. So this geographical metaphor directs attention to a location, a site in social relations, from which a disadvantaged group learns to observe and speak for itself and to the advantaged group about the unjust and oppressive social relations that have effects on their lives. By starting off thought from the daily lives of workers, one could explain the otherwise mysterious phenomenon of how wealth accumulated in the lives of the already advantaged while misery accumulated in the lives of the workers. One could do so without appealing to the typical biological, religious, social or political justifications for such inequalities that were promoted by the ruling groups of the day (and still of our neoliberal days!).

Of course there are many problems with using such Marxian theory today. Nevertheless the basic insight of this research methodology – its logic – has remained useful to many disadvantaged groups around the globe. In feminist hands, the standpoint strategy directed researchers to start off thinking about any and every project from women’s lives instead of from the conceptual frameworks of research disciplines or of the social institutions that such disciplines serve. Women had been excluded from the design and management of these disciplines and institutions. Those frameworks had been designed to answer questions that were for the dominant social groups, not for women or other

exploited groups. It was dominant institutions that sponsored, funded and monitored natural and social science research. Their policies were grounded in gender stereotypes. They promoted the “conceptual practices of power”, in Dorothy Smith’s words (Smith 1990).

Standpoint projects “studied up” (as the Marxists put the point). They started off thinking about the dominant institutions, their practices and cultures, from the women’s lives affected by them. Their goal was not to produce ethnographies of women’s worlds, valuable as those can be. Rather they intended to explain the high-level institutional decisions and practices responsible for initiating and maintaining such situations. In this respect they differed from the ethnographies that were frequently parts of such projects and with which they were often mistakenly conflated¹³. Standpoints are not to be conceptualised only as perspectives. Everyone has perspectives on the world, but standpoints are intellectual and political achievements in that a group has worked together to figure out how to achieve their own collective angle of observation. They require critical, scientific study to see beneath the everyday social relations in which all have been forced to live. They also require political struggles to gain access to the sites (the boardrooms, the command centres, the policy circles) where one could see how decisions have been made that directed and maintained sexist and androcentric social relations (Hartsock 2003²).

Standpoint theory produced stronger standards for good method in the natural as well as the social sciences. Similarly it produced revisions of other regulative ideals of the sciences, including “strong objectivity” and “robust reflexivity”, and it produced more rigorous and comprehensive standards for rationality (Haraway 1991; Harding 2004a, 2004b). Standpoint methodologies have by now been explicitly adopted across the social sciences, in some mixed social/natural sciences such as environmental and health studies, in several areas of biology and in some technology studies. They have even guided influential feminist work in social studies of physics and chemistry (Keller 1984; Potter 2001). Moreover, the logic of such methodologies has an organic quality in that it seems to appear whenever a disadvantaged group tries to articulate the legitimacy of its own knowledge needs against the research practices that serve powerful groups. Thus the logic of standpoint epistemology and methodology is routinely evoked in postcolonial writings that start

¹³ But see Smith (2005) for a critical ethnography.

off from the lives of Third World peoples to think about Western assumptions, policies and practices, indigenous knowledge systems, about encounters with European voyagers, botanists and physicians, or about modernisation or development theory.

One can still ask, however, if standpoint methodology/epistemology is too Western to be fully useful elsewhere. It was initially formulated within the Marxian and Enlightenment philosophic and methodological traditions, although it contradicts significant aspects of such legacies. Although it is positioned against both “positivist” regulatory ideals and practices in Western-origin natural and social sciences, positivism is not, to take just one case, one of the most problematic aspects of Indian society for women, as philosopher Uma Narayan (1989) pointed out. Moreover, standpoint theory’s appeal to the value of women’s experience can lose its critical edge in societies that conceptualise sex/gender differences as fundamentally complementary rather than hierarchical, and this is so regardless of whether such differences are in fact treated as hierarchical (*ibid.*). There are other ways, with significant relations to standpoint theory, to articulate research methodologies that can distribute their benefits more effectively to the least advantaged groups¹⁴.

Yet standpoint theory remains a valuable strategy to articulate the logic of “a space of a different kind for polemics about the epistemological priority of the experience of various groups or collectivities”, as one observer put the point: “The presupposition is that, owing to its structural situation in the social order and to the specific forms of oppression and exploitation unique to that situation, each group lives in the world in a phenomenologically specific way that allows it to see, or even better, that makes it unavoidable for that group to see and know, features of the world that remain obscure, invisible, or merely occasional and secondary for other groups” (Jameson 2004, p. 144)¹⁵. Standpoint approaches can recognise the positive scientific and political value of local knowledge without falling into claims either of its absolute, universal validity and applicability or of its legitimacy by only local standards. That is, standpoint approaches do not commit their users either to problematic older positivist regulative ideals or to a mere relativism of claims

¹⁴ For example, see Gloria Anzaldúa’s “borderlands” (1981), and Walter D. Mignolo’s articulation of the “colonial difference” (2000).

¹⁵ For a highly visible polemic about a standpoint claim, see the discussion of United States Supreme Court (then) candidate Sonia Sotomayor’s statement in a speech some years earlier that she would hope a wise Latina would make better decisions in some cases than a wise white man (Los Angeles Times 2009).

valid only in their local context. It is a symptom of the originality of this approach that it is so difficult to extract it from typical interpretations of it as either absolutist or relativist in a damaging way. Of course it is only from the perspective of the absolutist's exceptionalist position that these appear to be the only choices.

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8. Provocations and illuminations

Sciences (and technologies) and their societies co-constitute each other. Each provides resources for the development of the other – and this can occur whether such development is politically and intellectually progressive or regressive. Yet postcolonial and feminist intellectuals have argued that the sciences and technologies are never completely value-free. How should we think about the virtues of modern Western sciences and technologies in light of these challenging views of them? How should we think about the knowledge systems of other cultures? How should we think about many non-Western sciences and technologies that, today, function effectively for cognitively valuable and politically admirable projects in their own world, and yet still do not address women's needs where these differ from men's? What about those that do and must function in a modern world, but find themselves in some of the most deprived locations in this world?

By now it should be clear that there cannot be any one single recipe for science and technology research projects that are desirable from feminist and/or postcolonial standpoints. We can at least agree that we should not support one that conforms to the traditional Western conception of progress and how to achieve it. Women and men in different eras and places experience the nature and effects of colonialism, imperialism, postcolonialism, neocolonialism and the sciences and technologies that these social relations create in a different way. Cultures have their own distinctive histories, legacies, resources, values and interests, and it is the cultures themselves that must create discussions of how to best plot their own futures (with certain caveats about not harming others or their own most vulnerable members, of course). It would thus be arrogant and ineffective for any one culture to take it upon itself to determine what will be best for all and especially for Western researchers and scholars to do so for non-Western societies. There already are and must be many different kinds of epistemological, scientific and technological struggles over priorities, goals and strategies.

Meanwhile, our natural/social environments themselves constantly change. They continually produce unexpected phenomena such as retroviruses, ozone holes and global warming, as well as deadly financial crises, hurricanes, fires and mudslides. Our daily environments now seem crowded with risks to life and health that were not imagined even one generation ago. Westerners have to learn how to live with not knowing how such relations between knowledge systems and with natural/social orders will turn out. The vitality of both nature and global tendencies toward democracy in all their local varieties depends on our learning to tolerate – even thrive – in the face of continually appearing uncertainties.

In the world as it is, postcolonial and feminist science and technology studies can help us locate innovative strategies for moving forward by pursuing not only their own illuminating though provocative challenges to conventional assumptions, but also by exploring the benefits each of them can gain by sympathetically considering each others' projects.

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Gender Knowledge in the Arab-Islamic Realm: On the Social Situatedness of Gender as an Epistemic Category

Heidemarie Winkel

1. Introduction

The epistemological function of the sex/gender differentiation has been highly disputed in Western social sciences since the 1970s. In the beginning, the focus lay on the term sex and the social consequences of its meaning as a given biological factor for women's and men's socialisation (West and Zimmerman 1987). Today, gender is contested as well, because the concept tends to reify the sexual divide between women and men (Kessler and McKenna 1978; Gildemeister and Wetterer 1992). Numerous historical and sociological studies have built on this insight, demonstrating that the lived reality of two incommensurable sexes is part of an epistemological shift since 1800, intertwined with the Western history of science (Foucault 1966, 1969; Honegger 1991; Schiebinger 1993, 2004). Accordingly, gender is a term deeply rooted in the Western mindset and its socio-historical development.

Despite a strong awareness that gender is an analytical category which is deeply embedded in Western social history, the concept's transfer to non-Western societies consistently fails to acknowledge its social situatedness in the Western context. As a result, gender configurations in other societies are viewed through Western lenses, which mask endogenous gender schemata. This paper will analyse the distorting effects of Western lenses with reference to an Arab-Islamic context. I argue that gender is not primarily associated with sexual difference in this societal realm. Instead, gender knowledge is mainly shaped by equitable reciprocity. This is a basic feature of social life in the Arab world, with particular relevance for the understanding of gender relations. Equitableness does not refer to individual justice or the conception of individual

rights, but rather to the notion of extensive mutual obligations as the core of social interdependency in Arab societies. Equitable reciprocity constitutes the nucleus of a gender concept in its own right alongside the Western European model of sexual difference.

Against this background, two facets of gender knowledge will be traced: religious knowledge and medical knowledge. The focal point will be the development of these knowledge patterns in the course of the social transition from medieval Islam to modernity since 1798¹. The theoretical framework of analysis will be the sociology of knowledge, in which religion is regarded as an independent knowledge system alongside others, notably the sciences (Knoblauch 2005). I will show that gender discourse in the Arab world did not commence circa 1900 as a political debate inspired by Western alienation from the *femme orientale* (Varisco 2007)². Gender relations had already been a significant issue of religious and medical enquiry in medieval Islam. In the 19th century, the social awareness of gender relations developed in a new direction as a consequence of growing societal change, which was partially aligned with Western influence (Hourani 1992); but the predominant pattern of gender knowledge remained equitable reciprocity.

The extent to which gender knowledge embodies the social core concept of equitable reciprocity will be exemplified by means of Egypt's grand mufti Muhammad 'Abduh and his gender theology. 'Abduh was not only one of the most important 19th century theologians in the Middle East, but the *salafiyyan* reformist³ is also known as the spiritual forerunner of Islamic modernism, striving to reform Muslim societies from within, against colonial interests. 'Abduh's impact on Egypt's social transformation to modernity is, however, a contested issue, especially from the perspective of contemporary Islamic fundamentalism, which is most strongly represented by the extremist neo-*salafiyyans*, for example, during the recent Arab Spring. Egypt is nonetheless an important case to track the development of gender debates for three reasons: Egypt

¹ 1798 is the year of Napoleon's siege of Egypt. It was the first time that a Western ruler had occupied Arab lands. It is known as the beginning of modernity in the Middle East.

² These debates were induced by the writings of Qasim Amin (2005⁴ [1899/199]), for example about *The New Woman*; Amin was one of the founders of Egypt's national movement. His books were a response to British writings, in which women's life in Egypt had been harshly criticised (Ahmed 1992).

³ While the traditional *salafiyya* mainstream fosters a literal understanding of the *Qur'an*, the *salafiyyan* reformist stream focuses on the Islamic forefathers (*salaf*) as well, but asks for a reinterpretation of *qur'an* and *sunna* – as the only relevant sources – starting from the historical experience of social change.

has been known as a model of societal change and modernisation in the Middle East since 1800; it houses the supreme authority of Sunnite Islam in Cairo; and it is – next to Istanbul – a key location for the prospering of Middle Eastern feminism (Baron 1994; Lewis and Micklewright 2006). All in all, the grand mufti's gender theology is a prime example of the dominance of Arab interpretive patterns in the formation of gender knowledge during societal transformation to modernity.

In order to shed light on this process, I will first introduce the notion of equitable reciprocity. This will be contrasted with the Western configuration of gender knowledge in order to illustrate the social situatedness of both gender conceptualisations. The second step will be to delineate how far Arab knowledge structures of gender inequality have been concealed and distorted by the Western notion of two entirely different, "natural" sexes, and, furthermore, the extent to which this gender conception has enforced endogenous, misogynic perceptions of femininity. I argue that in Arab modernity gender primarily remains a relational category based on reciprocity – despite its entanglement with the Western concept. This will be exemplified in a third step with reference to 'Abduh's gender theology. It is a symptomatic case indicating how far religious gender knowledge constitutes itself as an expression of basic societal orientation patterns; it also demonstrates that changes of religious gender knowledge are unfolding with reference to this prime social feature. All in all, the example of religious gender knowledge demonstrates the necessity to discern gender as a multiple category: gender is culturally tied and structurally adjusted to the particular reality of societal life.

2. Gender knowledge in the Arab realm: equitable reciprocity

Whether gender is a constitutive category of social division and how this division is reasoned, varies historically as well as interculturally. Knowledge structures specify how far gender is a matter of categorial difference or not. The social change in the patterns of female and male sociation from the European Middle Ages to modernity is such a case of knowledge transformation. Until the mid eighteenth century men and women were perceived as two versions of one sex. The notion of gender as a dualistic system, based on the biology of two different, incommensurable bodies, developed at the end of the 18th century (Laqueur 1986, 1992), thus ensuring the continuation of gender inequality beyond the decay of the class-privileged social order. The new

gender arrangement constituted, for the first time, a categorial regime of inequality, based on the modern scientific formation of knowledge and its modified epistemological function (Foucault 1966, 1969).

When Western writers described Middle Eastern women and their living conditions in 18th and 19th century travel writings, they did so through these modern lenses (Lewis 2004, 2005). Additionally, an internal differentiation was invented: while the Western gender configuration was “presented as the model of ultimate civilization” (Davies 2006, p. 396), descriptions of Arab gender relations were infused with a *mélange* of scientific sexism and scientific racism (Stepan 1982; Winant 2000). According to the dualistic gender model, Arab women were attributed with a unique sexual character, highlighting their presumed nature as sexual beings. This representation of Arab women’s bodies fused into the image of the *femme orientale* (Varisco 2007, p. 158), combined with the stereotype of *the* Islamic gender regime. According to this notion, Arab women are the antipode of Western women, and the Muslim woman and the Islamic gender order are allegories of oppression. Their strongest representations are the *harim* and the veil as symbols of social inequality and exclusion.

All in all, orientalist stereotyping surmounts Western gender polarisation insofar as the binary model of sexual inequality is linked with an ascription of cultural inferiority next to the claim to cultural hegemony by Westerners (Simon 2002; Dobie 2002). In order to understand the consequences of Western gender stereotypes merging with Arab-Islamic narratives about women’s sexuality, we have to take one step back to pre-modern scientific discourses. Arab medical knowledge was based on Greek humoral medicine, alongside Persian and Roman medical traditions. In contrast to Europe, Greek medical texts were widely translated and passed on in the Arab realm since the 7th and 8th century (Eckart 2009, pp. 67 ff., 113 f.). Literature about the function of the humours also included an introduction to the concepts of reproduction and sexuality. The most famous resource in this regard is Ibn Sina’s encyclopaedia *al-Qanun fi’l-tibb* (*canon medicinae*). Ibn Sina, known as Avicenna in the Latin world, served as a principal medical reference source until the early 18th century. In accordance with Galen, Ibn Sina promoted the concept of “inverse similarity between male and female sex organs” (Dallal 2006, p. 401). While the Western and the Arab context shared this one-sex model as the main biological theory relating to reproductive organs during medieval times, the views on “female sperm” as means of procreative capability had different roots

and developed in diverse directions. In the European context, Aristotle's and Galen's contradictory perceptions produced an ambivalent picture. Aristotle did not recognise female sperm at all and saw only men as actively contributing to conception. By contrast, Galen believed – with reference to Hippocrates' discovery of the ovaries – that women's and men's semen equally shape the foetus. In the Muslim realm, Galen's theory gained an essential position, dominant until the 18th century (Dallal 2006, p. 402). Ibn Sina, for example, did not only agree about the existence of female and male sperm. He ascribed "to both of them active and receptive potentials" (*ibid.*). Thus women were perceived as equally contributing to reproduction during the early medieval times up until the Ottoman Empire (Ze'evi 2006, p. 386).

The medical position had an equivalent in the religious sphere. As Leila Ahmed (1992, p. 65) points out, the *qur'an* as well as some *hadiths* emphasise "an egalitarian view of human biology", alluding to female as well as male semen, both of equal significance. Moreover, *qur'an* and *hadiths* provide guidance on sexual matters and can be seen as the foundation of an Islamic sexual morality (Khan 2006), which also protects women's pleasure as an issue of relevance⁴. Ahmed frames Islam in general as an expression of an ethical vision, centring on the equality of all human beings⁵. She emphasises that *qur'anic* verses are "unambiguously declaring the spiritual equality of men and women" (Ahmed 1992, p. 67). This inherent gender egalitarianism also found its expression during the Ottoman Empire in the legal sphere (Musallam 1983; Imber 1996; Ze'evi 2006). According to Dallal (2006, p. 406) there is "a large body of legal literature that regulates sexual relationships" in accordance with medical knowledge about women's reproductive potential. Protocols of local court cases show that women could dissolve their marriages because of their sexual dissatisfaction⁶. All in all, there was an apparent tendency towards an egalitarian approach with regard to sexual matters, strengthened by medical opinions which emphasised women's role in the process of insemination.

⁴ According to Imam Ali, the cousin of Muhammad, women's pleasure is a necessary precondition of sexual intercourse: "When you intend to have sex with your wife, do not rush because the woman (also) has needs (which should be fulfilled)" ('Amili 1391 A.H., vol. 14, p. 40).

⁵ With regard to Islam's inherent ethical egalitarianism cf. Nikki Keddie (2007, pp. 24 f.). See also Abdel Wahab Bouhdiba's monograph (1985) about "Sexuality in Islam". He insists that the ethical complementarity of the sexes negates the apparent misogyny.

⁶ With the Hanafi and the Shafi'i traditions there are two Islamic schools that allowed women "to dissolve their marriages in the case of the husband's impotence or his inability to satisfy sexual needs" (Ze'evi 2006, p. 386).

This was further supported by the opinion that women's sexual pleasure was a precondition for reproduction: "as such, pleasure and procreation are coupled in Islamic scientific discourse not just for men but for women as well" (Dallal 2006, p. 403). Dallal (*ibid.*, pp. 406 f.) even sees a "tendency in Islamic law to sanction the right of women to sexual pleasure" itself, beyond its presumed medical necessity. In general, medieval medical as well as religious and legal texts encompassed a wide range of topics about women's sexuality⁷. How far this indicates a general openness to sexuality, as Dallal suggests, is another matter, because sexuality was not a "fit topic for polite Ottoman conversation", for example in the context of education (Zilfi 2006, p. 231). But within medical and religious texts sexuality was widely seen as an equally shared and viable aspect in the life of men and women.

Despite this deliberate reflection on female sexuality, social structures in Arab-Islamic societies did not mirror the egalitarian view on biology and sexuality. Instead, gender relations in Muslim societies were determined by a patriarchal marriage system within the context of tribal kinship units, including male "proprietary rights to female sexuality" (Keddie 2007, p. 24). In everyday life sexuality was a matter of social control, "a salient feature of Ottoman political and social governance" (Zilfi 2006, pp. 231 ff.). In this regard, honour codes are an illuminating example of how the coexistence of an ethical gender-egalitarianism on the one hand and institutionalised structures of gender inequality on the other hand can be combined. Honour codes were anchored in the wide range of locally oriented tribal societies, each following their own rules. Thus, these codes afford important evidence into internal dynamics and the regulative power of locally bound knowledge structures. By means of honour codes, local clan structures developed to be the predominant *Ties That Bound* (Fay 1996), not only consolidating the extended family's inner coherence, but at the same time regulating women's lives: "In this code the honor of the patrilineal family is crucial to that extended family's respect and power. Family honor ... depends primarily on the perceived good behavior of its females. This involves modest deportment, no mixing with unrelated males, deference and obedience to males" (Keddie 2007, p. 39). Ultimately, the measure of honour is the communal well-being of the kin group based on the complementarity of the sexes, of which women's honour is one aspect

⁷ Contraceptives are another example of the Islamic physiology of pleasure (Musallam 1983).

as well as men's *qiwama*, their duty to protect and care for the family (Stowasser 1993), thus ensuring reciprocal relationships. This principle of building relationships includes a notion of equality aiming at the "unity and solidarity of the collective" based on identical obligations and forms of service (Stowasser 1996, pp. 33 f.). This does not mean "absolute and individual social, political, or economic equality" (*ibid.*, p. 33), and it definitely contradicts a Western understanding of equality. It rather sustains complementary forms of involvement as tribute to the kin group. Thus men and women are involved as communal members of equal rank in moral and spiritual terms, without necessarily being equal in terms of their position in the hierarchy of social structures.

In summary, the tension between men's proprietary rights to women's sexuality, as expressed, for example, in honour codes, and Islam's ethical gender egalitarianism, as incorporated in legal and medical notions of procreation, dissolves on closer inspection of the principles of interdependency in the kin-based structures of Arab societies. The extended family formed the dominant structure of social life until the 19th century and is still today a vibrant frame of identity (Barakat 1993, pp. 23 f.; Stein 2006). Gender unfolds its reality, first and foremost, with regard to the microstructure of kin relations, including women's – and men's – sexualities. While women's right to sexual pleasure was sanctioned by Islamic law and medicine, Islam granted men rights to a more permissive sexuality (Ahmed 1992, p. 63). But neither women's nor men's rights to sexuality were constructed as individual rights in terms of Western equality standards. Instead, "wives have rights corresponding to those which husbands have, in equitable reciprocity", as Sura 2:229 states (Polisi 2003). In the background of this – *ex post* religiously legitimated – world view stands the group's pre-eminence over the individual as a basic orientation pattern. As a consequence, the individual has extensive obligations with regard to different relatives, but can also expect widespread support along the lines of given reciprocity rules for spouses, parents and children, cousins etc. Accordingly, the social standard of equality regulating gender relations can be described as equitable reciprocity. Along this principle, ethical gender egalitarianism and non-egalitarian rules are not contradictory, "except in a modern view" (Keddie 2007, p. 25). This leads to the insight that the Western gender conceptualisation does not reveal, but predominantly masks the constitutive endogenous principle of the gender configuration in the Arab world and its transition to modernity. This crystallises in particular during the encounter of Western and Arab forms of gender knowledge.

3. The encounter between Arab and Western forms of gender knowledge

During the 19th century Arab societies passed through a social transformation that triggered a change in the constitution of gender relations, embedded in new forms of social differentiation. Industrialisation, proletarianisation, urbanisation and the development of higher education re-shaped traditional gender structures and partly pushed them in new directions (Tucker 1985, pp. 20 ff.). Women of the upper and middle-class benefited from educational reforms in the second half of the 19th century insofar as education developed to be a primary condition for women's step into the professional world and subsequently became their first occupational area. In comparison, the recruitment of lower-class women for factory labour, starting at the beginning of the 20th century, remained minimal (Tucker 2005, p. 84). While men were increasingly hired for the state-run production of export commodities and consequently migrated to the cities, women's productive function in the subsidiary economy was marginalised and reduced to the household. *Fellah* families were transformed into a social space of reproduction, accompanied by a growing exclusion of women from the public sphere. Technisation and the Ottoman agrarian reform supported this trend (Abdo-Zubi 1992; Tucker 1993; Agmon 2003).

At the same time, new notions of family and home developed, together with a kind of bourgeois understanding of wifedom, motherhood and child-rearing: "A fundamental shift occurred ... as mothers became responsible for the physical, moral, and intellectual development of children", tied by a scientific gender discourse (Shakry 2006, p. 355). Around 1900 the home had become a place in which children's upbringing and modern household practices were important concerns, based on scientific principles of domesticism. These concepts originated in the West and found their way into Egypt via journals and literature, not least from women themselves, promoting the separation of life spheres and an ideal of domesticity. At large, women's images became a crucial point of interest in the public concern about the domestic realm during the final decades of the 19th century⁸. This was shaped in accordance with Arab-Islamic core concepts of life (Shakry 2009, p. 357). Arab reformers drew upon resources indigenous to Islamic traditions,

⁸ This included a debate about the relevance of the family as a social sphere of national interest (Pollard 2005).

emphasising the necessity of a proper pedagogy and the moral education of the self according to social core principals like communal well-being. Instruction in the science of *tarbiyya*, aiming at children's education as well as women's personal growth, intended to mould behaviour against the background of societal change, but not as a fundamental reform of knowledge structures along Western lines.

The scientifically modelled debates about the domestic sphere and the educated housewife were saturated with notions of the family which may initially appear to be little more than a copy of the Western model. While Quasim Amin's *New Woman* (2005⁴ [1899/1900]) for example was definitely inspired by colonial approaches, emphasising the necessity of women's education for societal progress, it would be a misinterpretation to explain the modern Arab gender concept first and foremost as an extract of Western gender notions about sexual difference and the functional separation of the private sphere. Women's conceptualisations in Arab accounts on gender, in particular those about motherhood and marriage, are not initially based on dualism and dimorphism. Instead these concepts were thoroughly steeped in notions of complementarity and reciprocity. It was not women alone who were at the centre of interest, but the family and household relations as a whole, literally those between man and wife, mother and son, father and daughter, niece and nephew etc. (Pollard 2005, p. 261). Although scientific domesticism ideally designed the modern Arab family as a triad, consisting of a father, a mother and children, the extended family never lost its relevance as a basic cognitive schema. In accordance with this core unit of social life, communal well-being and reciprocity are recalled as basic principles of social coherence. This is also true despite the existence of multiple categories of belonging in Arab modernity, like national identity and citizenship (Joseph 2000, 2001).

As a consequence, neither the Western notion of gender as a dualistic system of sexual dimorphism nor the public-private axes are adequate analytical means to explain the picture of gendered relations in the Arab-Islamic world in detail. Using the Western gender concept as a categorial lens in the Arab realm adheres to a continued "imperial" eye. As Mary Louise Pratt (1992, p. 2) puts it, this eye tells us more about our own knowledge structures as Westerners, in particular about the relevance of nature and science in our worldview. Gender sociology has already criticised the sex/gender distinction with its reification of "biological matters of fact" as an essentialising and universalising approach (Kessler and McKenna 1978; West and Zimmerman 1987; Gildemeister and

Wetterer 1992). But it has scarcely been realised yet that this approach has different consequences for different gender cultures. The transfer of the dualistic gender category to the Arab realm does not merely mask the core concept of equitable reciprocity and its relevance for the reality of social interdependency in Arab societies based on mutual obligations. Instead Arab and Western gender conceptualisations are blended, thus leading to a distortion in the perception of gender difference in terms of opposition and polarisation instead of reciprocity. As a result, sexist knowledge structures emphasising women's supposed bodily and carnal character, particularly their presumed "nature" as sexual beings, are reinforced. According to the Hanbali tradition, for example, women's whole body is '*aura*', literally meaning nudity or something that has to be veiled; in the case of men the term only marks their genitals⁹. Against the background of the dualistic gender matrix the focus on women's sexuality has been accentuated, thus strengthening the perception of women as a different – and even dangerous – category on its own (Barakat 1993, pp. 102 f.). The transfer of the dualistic gender perception into the Arab realm accentuates the polarisation of sexualities as the primary perspective on gender reality. Conceptions of women's sexuality as inferior and deficient are particularly exposed nowadays, and in this sense they are a modern appearance, while orientation patterns like reciprocity and the priority of the group are disappearing behind a wall of sexualised stereotypes tied to the idea of two opposite genders.

This is not to say that Arab gender schemata originally did not embed inequality and asymmetry; they did. But the point of interest here is how the amalgamation of Arab and Western forms of gender knowledge are effecting a perception of the Arab-Islamic lifeworld and its gender regime as an allegory of gender oppression, while the consequences of the so-called natural binary gender code in the Western realm keep disappearing behind notions of naturalness and universalism. Realising how far gender remains a relational category in the Arab realm also reveals that the dualistic gender matrix is a culturally tied and structurally adjusted category in the Western world, and that this conception has enforced knowledge patterns of inequality as a consequence of its categorial dualism. How far gender remains a relational category in the Arab-Islamic realm despite social and political transfor-

⁹ The Hanbali tradition is the most conservative and the smallest of the four Sunnite schools.

mations will be exemplified in a further step by means of Muhammad 'Abduh's 19th century gender theology. The Egyptian test case shows the extent to which religious gender knowledge is a mirror of basic orientation patterns and how far gender needs a theoretical frame as a multiple category.

4. Religious gender knowledge as a mirror of equitable reciprocity: an Egyptian test case

In the 19th century many Middle Eastern societies had started to re-shape their societal structures on a larger scale and with growing speed, with Egypt in the first place (Freitag 2006). Gender arrangements and family relations had been part of this process as already described above. Typically, transformation is not automatically accompanied by a change of pivotal cognitive schemata (Eisenstadt 2002, 2003). Basic cognitive figures like equitable reciprocity functioned rather as a guiding principle of societal reform. Additionally, many Egyptian reformers frankly opposed an unfiltered importation of European ways of life. Westerners' emphasis on the need for a change in gender relations, for example, was perceived as a visible expression of Europe's interest in cultural hegemony. Indeed, Western criticism of Arab-Islamic societies regularly pointed to gender arrangements as proof of Arab's civilising backwardness in comparison with the European standard. Westerners did not only turn the abolition of women's oppression into a precondition for social development, but they also used gender inequality as a justification for colonial intervention¹⁰.

Thus it was not by chance that reformers like the religious scholar Muhammad 'Abduh rejected Western influence for political reasons, while arguing for change from within at the same time. What makes 'Abduh interesting in this regard, is the fact that he wanted to converge Western and Arab standards of knowledge and education. Part of his theologically based considerations was an elaborate gender approach.

In order to understand the relevance of 'Abduh's undertaking, we first have to take a glance at his 19th century context. When Muhammad 'Abduh was born in 1849, Egypt had already passed through large-scale

¹⁰ See for example the case of Lord Cromer, Britain's consul general in Egypt (1882-1907). While he had no doubt about Europe's superiority, on the one hand he bitterly fought feminist ideas at home, and on the other hand he exploited them in order to promote the colonial project (Owen 2004).

reforms. Part of this process was the insourcing of Western sciences in the 1820s and 1830s. The turn to Western forms of knowledge was a stimulus for consideration in many regards, not only in the political sphere, but also among theologians like 'Abduh. He had already been introduced to European literature, philosophy and the natural sciences during his studies at al-Azhar (1866-1876). Interestingly, the "scientific findings" of 19th century Western scholars regarding women's physical and mental inferiority did not attract his or later reformers' attention: the Egyptian debate about Qasim Amin's *New Woman* around 1900, for example, did not copy the Western emphasis on women's minor cultural potential deduced from their presumed marginal intellectual and bodily capabilities. In his writings about *The Liberation of Women* (1899) and *The New Woman* (1900), Amin affirmed Islam's ethical egalitarianism as the anchor-point of women's liberation from oppression instead. He interpreted the notion of the presumed "superior physical and intellectual strength of men" as a result of "those years, [in which] women have been deprived of all opportunity and forced into an inferior position" (Amin 2005⁴ [1899/1900], p. 11). All in all, Arab reformers did not align their ideas along the Western concept of gender dualism.

This is also characteristic of Muhammad 'Abduh's view, despite his strong involvement with Western methodological standards. 'Abduh was particularly interested in reason as a means of working on ethical issues, such as gender beliefs, as they are embodied in the *qu'ran* and the *hadith*. The real Islam, he maintained, "had [a] simple doctrinal structure: it consisted of certain beliefs about the greatest questions of human life, and certain general principles of human conduct" ('Abduh quoted in Stowasser 1993, p. 35). It was 'Abduh's aim to elaborate on these convictions. In this regard, he favoured reason and interpretation instead of *taqlid* in contrast to conservative and fundamentalist reformers. *Taqlid* is a legal term meaning to follow established doctrines and traditions strictly word by word, without asking for reason or evidence. Instead, modernists like 'Abduh focused on the *qu'ran* and the *hadith* as a hoard of ethical quintessence: "The prominent trait of the modernist school ... seeks to grasp the value system of the Quran as a whole, therefrom to win fresh and new guidance" (Stowasser 1998, p. 34).

Gender relations are a central example in this regard. 'Abduh was convinced that *ijtihad*, the individual interpretation of scripture, could solve present day problems like women's liberation from male oppression as it was sanctioned in the polygamy and divorce laws of medieval *fiqh* formulation. He argued for a legal reform in order to change religiously

based customs and practices in everyday life, stating that “such matters as divorce, polygamy, and slavery do not belong to the essentials of Islam” (quoted in Ahmed 1992, p. 140). This was embedded in a critical self-reflection: “the Muslims have been at fault in the education and training of women, and acquainting them with their rights; and we acknowledge that we have failed to follow the guidance of our religion, so that we have become an argument against it” (‘Abduh quoted in Ahmed 1992, pp. 139 f.). According to Barbara Stowasser (1994, p. 7), this has to be seen against the background of medieval religious scholarship which was “largely unchallenged”. Life had proceeded along the structural paths of patriarchal clan, gender and kinship ties, as outlined above, which served as the fundamental matrix for societal coherence, counterbalancing the trans-local power regardless of changes in authority. The theological-legal paradigm of medieval Islam had enshrined this structural frame. ‘Abduh voiced a strong mistrust in medieval exegetic lore that retained views on women’s supposed innate nature as weak and deficient within the frame of the one-sex model, like in the Hanbali school of jurisprudence (Stowasser 1994, p. 21). ‘Abduh criticised for example, the interpretation of Eve as Adam’s temptress as a cultural construction: “‘Abduh goes so far as to say that the [Adam and Eve] story has nothing to do with history ... the very faultiness of the Biblical creation story as reported in The Book of Genesis lies in its claim to be history” (Stowasser 1994, p. 17; Keddie 2007, p. 30). Thus the modernist’s exegesis showed a marked difference insofar as *qur’anic* history was understood as a history of divine examples.

While seeking to rediscover the original meaning of the *qur’an* and how it shaped the faith of the righteous predecessors, ‘Abduh placed great importance on the notions of women’s full humanity and equality with men before God, thus reverting to the notion of equitable reciprocity: in ‘Abduh’s opinion women are indispensable in shaping a truly moral society. Along the lines of ethical egalitarianism ‘Abduh called for educational and legal reforms in order to restore the dignity of Muslim women, but also to educate men in the meaning of Islam “so they would begin to deal with their wives in the spirit of love, compassion, and equality that the Qur’an enjoins” (Stowasser 1993, p. 35). An important example in this regard is ‘Abduh’s criticism of polygamy. Stowasser (1994, p. 121) emphasises that ‘Abduh wrote “in impassioned language about male tyranny ..., female exploitation and oppression, ..., all features of the nineteenth century reality of polygamy gone wrong”. Purportedly, this issue is known as the source of ‘Abduh’s most innovative

qur'an interpretations and *fatwas* in which he called for the abolition of polygamy and for a legal reform. An equally strong concern of 'Abduh were the harmful effects of divorce on public morality; according to him, women should have the right to request divorce – when harmed by their husbands (Stowasser 1993, p. 34).

'Abduh's exegesis does not coincide with Western human rights standards; it rather mirrors the cognitive pattern of equitable reciprocity. Reciprocity shapes the Islamic notion of equality and accentuates it as ethically based egalitarianism. As a consequence of 'Abduh's methodologically based emphasis on core values in *qur'an* and *hadith*, the traditional idea of egalitarianism is not only highlighted as a question of spiritual equality. 'Abduh posed women's full humanity with men before God as a practical matter of social life on a day-to-day basis, realised by means of education in a wide range of fields, from religion to "the proper means of raising children, and the conditions of the world, as well as a proper understanding of human relations" ('Abduh quoted in Haddad 1995, p. 58). This demonstrates once more that ethical egalitarianism does not include an entitlement to equal rights; it rather functions as a means of social cohesion via reciprocity and complementarity. According to Stowasser (1993) this also includes Sura 4:34¹¹, which is one of the most discussed Suras. For most readers it provides men with leadership (*qiwama*) in a strictly hierarchical way, and superiority in order to "protect" domestic life and well-being; it even allows men to beat women in case of their "refusal to obey". Stowasser points out that 'Abduh did not principally question this Sura; but he interpreted *qiwama* as an obligation for men in order to establish a marriage without oppression and tyranny, and as an expression of mutual responsibility and equivalence of the spouses. According to Leilah Ahmed, 'Abduh is clearly expressing that this Sura is not a "complimentary ticket" for domestic violence, since he writes: "... men and women are equal before God in the matter of reward, when they are equal in their works ... There is therefore no difference between them in regard to humanity and no superiority of one over the other in works" ('Abduh quoted in Ahmed 1992, p. 139). This concluding quotation strongly reflects the cognitive

¹¹ Sura 4.34: "Men are in charge of [are guardians of/are superior to/have authority over] women because God has endowed one with more [because God has preferred some of them over others] ... Therefore the righteous women are obedient, guarding in secret that which God has guarded. As to those from whom you fear rebellion, admonish them and banish them to separate beds, and beat them. Then if they obey you, seek not a way against them" (quoted in Stowasser 1994, p. 33).

patterns of equitable reciprocity and communal well-being as basic features of social life and in times of transition to modernity. Gender is presented as a relational category, despite new trends in social differentiation and the confrontation with the Western conceptualisation based on sexual dualism.

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5. Résumé: multiple genders

Despite the awareness that it reflects Western social history and its gender relations, the dualistic gender category is used as a common epistemological frame in manifold research studies centred on non-Western societies. The article demonstrates, by means of the Arab-Islamic realm, how far this practice overlooks gender realities which are not in the first instance structured by sexual difference and polarisation. Instead, commonly shared and culturally tied features of knowledge specify the particular gender reality: the history of modern Arab-Islamic gender knowledge, as exemplified in 'Abduh's theology, is embedded in a conceptualisation of gender that is first and foremost characterised by reciprocity and communal well-being as two dominant features of social interdependency in Arab societies. These knowledge patterns can be traced back to medieval Islam and are continuing in modernity beyond the Western conceptualisation of gender as categorial difference.

This leads to a fourfold insight. First, gender configurations have not been revealed for the first time in the final decades of the 19th century as an effect of colonial intervention, and particularly not as a consequence of Qasim Amin's writings concerned with the so-called "New Woman" as is usually assumed (Ahmed 1992). The debate, which Amin had caused, accentuated the perspective on gender relations in a new, modern way, namely with regard to the relevance of the domestic sphere for Arab societies and their national aspirations; but the gender concept remained in the primal configuration of social interdependency, which is the relationally and reciprocally based cohesion. This is also true for scientific considerations about domesticism, although this reflection was strongly pushed by colonial actors. This leads to the second insight. Despite its entanglement with the Western notion of gender as a biologically reasoned system of two incommensurable bodies, the Arab gender concept primarily remained a relational category based on reciprocity. As a consequence of the concept's continuance, women and men are also constructed in Arab modernity as communal members of

equal rank in moral and spiritual terms – without necessarily being equal in terms of their position in the hierarchical structure of Arab societies. This was described as the Arab principle of equitable reciprocity.

A third insight is that Western human rights standards are only partly addressable. A social context, based on the notion of communal well-being and the spiritual equality of human beings, primarily focuses on the interdependencies between its members, but not on the members as individuals with individual rights. In this regard equitableness is not a question of individual justice, but of the welfare of the society as a whole. At the same time, the Western findings regarding women's physical and mental inferiority can be interpreted as an approach contradicting Islam's ethical egalitarianism. As such this gender conception is rarely appropriate in a social context in which, already in the medieval era, there existed an informed reflection on gender relations, including religious as well as medical knowledge patterns. This leads to the fourth insight. Both streams of knowledge correspond to the basic feature of social coherence in Arab societies. The relevance of these knowledge formations does not arise out of the fact that medical views about the sexes developed in analogy to religious perceptions, namely as egalitarian views on human biology and women's reproductive functions. The point of interest is that both knowledge formations are built upon the same guiding principle: equitable reciprocity adheres to the notion of extensive mutual obligations as the core of social interdependency. As a consequence, equitable reciprocity constitutes the nucleus of a gender concept in its own right alongside the Western model of sexual difference.

The Arab example demonstrates that the epistemological function of gender as an analytical category is restricted, as long as it is only perceived as the social realisation of sexual difference. Within a frame of intercultural knowledge transfer, the epistemic function of the gender conceptualisation soon reaches the boundaries of its explanatory force as long as it is connected with the idea of two opposite sexes. The example of the Arab-Islamic realm shows that the analysis of gender has to be contextualised with regard to the particular underlying cultural knowledge patterns. Gender is not a given matter of fact, nor is it bound, in each case, to the idea of naturally given bodies; rather, the inherent conceptualisations of gender have to be rediscovered in each cultural case. As has been seen, gender is based on its own cosmos of knowledge configurations in the Arab context. This underlines the social situatedness of gender as an epistemological category, and the necessity to work much harder on its multiple social realities in the

future. The conceptualisation of gender as “multiple genders” is also applicable in the Western realm itself. The notion of multiple genders cautions against a univocal sense of gender as a universal fact, imposed across manifold social realities, functioning as a singular epistemological category. Instead it refers to the worldwide objectivity of gender as a culturally, structurally and historically tied reality of gender relations in plural manifestations beyond women’s and men’s bodily appearance.

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IV.

ORGANISATION OF SCIENCES AND WORK

Gendered Ways of Knowledge Work?

Stories of Gender Hegemony and Resistance in Temporary Jobs

Annalisa Murgia

1. Introduction

This article concentrates on the processes of constructing gender identities by highly qualified workers with temporary jobs through social and discursive practices. More specifically, I am concerned with understanding whether a change in the “standard” working model – which views a male, full-time employee as the norm – is also linked to changes in dominant gender models in the labour world.

Studies concerning changes in contemporary work have frequently highlighted the development of new forms of work and social organisation in advanced capitalist countries. A salient aspect of the current change consists in the gender issues that arise in relation to the reality of work and its representations. Contemporary transformations in work, linked in particular to the expansion of the service industry, the loss of stability, the centrality of relational competences and the diffusion of new technologies, are often described as resulting from a shift of demand from “masculine”, full-time manufacturing jobs to “feminine”, part-time service-based roles (Crompton 1999; Hobson 2000). Advanced economies are witnessing a reconfiguration of productive and social systems (Boltanski and Chiapello 1999), in contexts where information and communication technologies have clearly contributed greatly to the development of new forms of work organisation and the merging of what used to be sharply distinct domains: work time and life time, professional and private spaces, production and reproduction. In Italy as elsewhere, these processes have, on the one hand, been accelerated by the advent of the so-called knowledge economy (Rullani 2004), which requires advanced language and communication skills (Lazzarato 1997; Marazzi 1994; Virno 2001), and, on the other, been conveyed by ubiquitous mobile technologies (Armano and Murgia 2011). The precari-

sation, cognitivisation and feminisation of work are phenomena which combine with one another to produce diverse and multiple working conditions (Morini 2010).

In the literature, the expression “feminisation of the labour market” (Lash 1999; Adkins 1995) refers, on the one hand, to the increasingly high number of women in employment (a major trend over the last thirty years) and their growing presence in sectors traditionally pertaining to men. On the other, it stresses the importance acquired, in the new economy, by the above-mentioned communication and relational skills, these being competences assumed to belong more “naturally” to women. Furthermore, the concept of feminisation has often been used to explain the increasing instability and forced flexibility of contemporary work regardless of the worker’s gender. Beck (1999), for instance, uses the expression “feminisation of work” to describe the phenomenon of men doing precarious jobs, rather than the situation of women in employment. This category therefore stresses that specific forms of masculinity continue to characterise professional relationships, maintaining their predominance over other possible masculine or feminine forms (Alvesson and Billing 1992; Collinson and Hearn 1994), so that the characteristics related to femininity are undervalued, denied, or unrecognised (Acker 1990; Davies 1996). Although the dynamics driving gender discrimination have long been acknowledged in analyses of men’s and women’s professional paths (Kanter 1977; Reskin 1984), the spread of non-standard jobs has emphasised some of their characteristics, occasionally even in a paradoxical way.

This article is organised as follows. I first introduce the links between the proliferation of non-standard contracts and the increase in immaterial and cognitive competences required by the contemporary labour market. The second section examines new inequalities, particularly gender inequalities, for the so-called “knowledge workers”. After discussing the context and the methodological implications of my research, I describe the main aspects that have emerged from interviews with a sample of 40 women and men with temporary cognitive and immaterial jobs, in order to show how, by means of narratives, the prevailing gender models linked to knowledge and non-standard work are constructed.

2. New positionings in non-standard work

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The proliferation of non-standard types of contract and work has further emphasised the persistence of old gender-related stereotypes concerning the distribution of domestic and care tasks (Poggio 2006) as well as the chances of accessing a professional career and developing it (Saraceno 2005).

With regard to soft skills and competences, there is a greater need for management capabilities in order to cope with transactions of different kinds – emotional, cognitive, ludic or culture-related – and it is a need that concerns the entire world of work. This is a process that involves every individual, in different ways and at different times, and it produces new levels of inequalities, and also gender inequalities, particularly for those referred to in the literature as “knowledge workers” (Marazzi 1994; Lazzarato 1997; Gorz 2003; Virno 2004). Increasingly, workers must know how to relate to the content of their work in an active and creative manner. Post-fordist firms can and must be lean, modular, networked, virtual and supranational. The overriding necessity is for a process whereby knowledge is “translated” from an informally circulating personal and social good into intellectual capital valuable to the firm (Armano 2010). Transversally to these changes, the profile of the flexible knowledge worker emerges – a salaried specialist consultant – engaged in “typically post-Fordist work” (Rullani 2004). This particular new class has been caught in what we might call “the passion trap”. On the one hand, they are promised that their work will deliver passion and pleasure and a satisfying professional experience; but on the other, they experience passion in its literal meaning: the suffering, sorrow and pain caused by the contractual arrangements and unstable conditions that the members of this category are often forced to accept. In fact, the peculiar condition of self-identification by people with the work that they perform and their conviction – in the case of certain activities rich with meaning – that they are doing something beautiful, important and that they are working for themselves, subjects them to twofold forms of stress and self-exploitation. These are workers who in their workaholic hyper-identification (Robinson 1998) are both voluntarily and compulsorily “in production” (Armano and Murgia 2011).

This process, which refers to the transformations affecting the world of work, cannot be distinguished from the broader proliferation, which in Italy began in the mid-1990s, of what has been termed non-standard or “atypical” work: that is, any work situation which is neither subordinate

nor independent full-time employment. Although the dynamics of gender discrimination have been widely explored in analyses of women's and men's professional careers, the spread of temporary and precarious jobs has brought out some interesting aspects, particularly in the area of knowledge work. For instance, a particularly common claim with regard to non-standard jobs is that the various forms of flexible work are advantageous to women. Its rationale is that, given the instability and adaptability constantly pertaining to feminine work (interruptions, periods of employment followed by periods of unemployment), women are more ready than men to adapt to a different model of professional development and to gain more benefits from the current configuration of the labour market. This claim, however, starts from an essentialist perspective, automatically ascribing characteristics traditionally considered feminine to women, and those traditionally considered masculine to men. Moreover, it prevents understanding of how gender attributions are constructed in workplaces. In fact, this is not a matter of biological determination; rather, it concerns how people construct their own identities and apply certain discursive and relational practices so as to position themselves in contexts of asymmetric power (Bruni et al. 2000).

3. Un/stable gender positionings in non-standard work

Whilst in recent years there have been a number of studies analysing how transformations of the "new professionals" have affected the lives and identity-setting processes of individuals (Sennett 1998; Dent and Whitehead 2002; Barley and Kunda 2004), little research has been conducted on the construction of gender identities within forms of temporary work (Wajcman and Martin 2002) and particularly in the knowledge economy (Walby et al. 2009). The aim of this paper is to stress identity-construction and gender-positioning processes in the context of stories recounted by male and female knowledge workers who experience work instability on a daily basis.

The concept of identity applied here does not refer to a static and individual dimension, "something someone is". It instead refers to a process-based and manifold dimension (Gergen 1991), "something someone does" with other people (Poggio 2004). Seen in this way our identities are not connected to an "essence", but instead a performance, embedded in specific situations, specific places and experienced in a specific social context (Butler 1990). A relational concept of oneself, situ-

ated in performances and discursive practices, has produced the notion of self-identity as narrative (Giddens 1991), of oneself as story-teller (Bruner 1990), of identity as performance made up of autobiographical acts (Czarniawska-Joerges 1995). Whenever someone talks about their life, through a discursive interaction, they perform a biographic practice that contributes to the construction, change and maintenance of their own self. Telling a story means giving a sequence and a sense to one's acting, creatively and dynamically creating not only the content of the story but also one's own discursive identity (Czarniawska 1997). Telling one's own story, most of all when asked about it, therefore makes an important contribution to the identity construction process (Gherardi 1995).

To the same extent, gender identity cannot be conceptualised as an essential entity or as a unitary and definitive product of the socialisation process. It is built-up through social and discursive practices that characterise the relationship between social actors (Gherardi 1995). Just like the notion of individual identity, gender identity must be framed as a problem (Butler 1990; Davies and Harré 1990) and regarded as continually reconstructing and redefining itself. Accordingly, men's and women's stories and narrative schemes cannot be automatically linked to sexual membership; rather, they represent the medium of the interaction through which gender is constructed (Gherardi and Poggio 2003). In this sense, biographic narratives can be interpreted as a rich source of gender identity negotiation (and maybe more) as they are assembled by referring to public narratives (Somers and Gibson 1994) or cultural repertoires (Lamont 1992), that is, the prevailing normative discourses about men, women, employment, work, family and other life dimensions (Violi 1992). The life story told by an individual, in fact, allows the account of his/her individual experience to be linked with the analysis of specific cultural practices or their change.

The specific question that I address in what follows is whether the increasing distance from the "standard" working model – typified as "fordist" employment – is also being accompanied by a change in the prevailing gender models. In particular, I will present the results of a qualitative research project that has been gathering the stories of women and men with temporary cognitive and immaterial jobs, my purpose being to show how, by means of narratives, the prevailing gender models linked to knowledge and non-standard work are constructed. Most of all, I will stress how these models are disputed and alternative ones are proposed.

4. Research design and methodology

In order to illustrate the processes involved in gender-identity construction by temporary workers, I will present some findings from research carried out in the province of Trento (an area of North-Eastern Italy) within public organisations.

The research findings derive from 40 narrative interviews conducted with knowledge workers – 20 men and 20 women – aged between 25 and 45, between January 2007 and March 2008 within different research institutes and departments which at the time of the research were all part of the local public administration. All the interviewees had high professional profiles and qualifications (degree, masters degree or doctorate) and, at the time of the research, they were all employed on temporary contracts.

A major reason for selecting these particular working worlds for analysis is the rather widespread use in them of many forms of temporary labour in the sphere of highly-qualified knowledge work, such as contract technicians, freelance workers, contract teachers and so on. The type of employment relationship matters as well. Among the various contractual forms that give no guarantee of temporal continuity, I focus on *Co.Co.Co.*¹ – as examined by various studies on current changes in the Italian labour market – because they best represent the new forms of flexible work.

Another reason for this choice is the over-representation of women in these sectors, an aspect which highlights a marked form of discrimination in the Italian labour market: the large number of women in the most unstable and least protected jobs (Istat 2010). The increasing use, within the public administration, of non-standard contracts – a phenomenon which mainly involves the female component of the labour force – has directed my attention to the striking polarisation between workers who are protected and those, females and males, who are not.

The place of the meeting was always selected by the interviewees, whose major concern was discretion and anonymity with regard to co-workers and employers. The interviews were therefore conducted in the workers' homes, in public places (a park or café), at the university

¹ *Co.Co.Co.* stands for *collaborazione coordinata e continuativa* (literally “continuous and coordinated collaboration”). This is a temporary employment relationship, in the public sector, for employer-coordinated freelance work.

and, very rarely, at the workplace (during the lunch break or at the end of the work shift). Conversations – audio-recorded and integrally transcribed – lasted about 90 minutes, with a few exceptions ranging from 40 minutes to two and a half hours.

The purpose of using narrative interviews as a research tool is to collect life stories which not only mimic the time and recompose the sense of the interviewees' biographies but are also particularly effective instruments for identity construction (Poggio 2004). As Hannah Arendt suggests, in fact, thought based on experience is necessarily translated into stories (Young-Bruehl 1977). In this sense, life and life-stories are inextricably interconnected in the constant production of senses and meanings (Brockmeier and Harré 1997). In particular, the analysis of narrative interviews makes it possible to focus on identity construction by individuals, combining the dimension represented by a certain background life-experience with the relationships that the individual has established with his/her social world (Schütze 1987). Moreover, narratives are powerful means by which to depart from the traditional paradigm and the treatment of work and workers as objects of analysis and study, by empowering the interviewee to compose their own narrative. Therefore, the aim of the paper is not to account for the "facts" and ongoing changes in the labour market. It is instead to treat narrative as a practice that allows subjectivities to act and elaborate new representations of work and other aspects to date little considered, following the narrative process of interpretation and meaning attribution.

This methodological approach has particularly stressed the tool of (narrative) positioning analysis by means of which it is possible to analyse the identity construction of the subject narrator (Butler 1995; Davies and Harré 1990). This is an innovative standpoint of analysis because it focuses on the interviewees' positionings *vis-à-vis* the characters in their stories (Riessman 2001) and *vis-à-vis* public narratives (Somers and Gibson 1994) and prevailing cultural repertoires (Lamont 1992). This paper will concentrate on analysis of gender positioning in discursive practices (Gherardi 1995; Riessman 2002), bearing in mind both the individual experience and the narrative practices of the reference culture. Focusing on personal stories, moreover, signals a break from the prevailing "male" discourse (Cigarini 2006) that has long characterised labour studies based on the male breadwinner model, the separation of life spheres and the phases characterising life trajectories.

5. Precarious knowledge workers' stories: discursive positionings of gender and identity

By analysing gender positioning in the narratives of temporary knowledge workers in the public administration of the province of Trento, I have identified different types of identity construction on the basis of the stories told during the interviews. The result is a focus on how practices of hegemony and gender resistance are carried out in order to understand whether the demolition of the traditional working model is matched by an equal erosion of the prevailing gender model on which the former is founded.

Numerous studies have sought to show the existence, among the many models possible, of a more legitimate ideal-type of masculinity and femininity. That is, an ideal-type that prevails over the others, defining identity and positioning in a manner appropriate for women and men within a specific symbolic order (Connell 1995). Individuals can therefore comply with and follow the "natural order" which makes something partial become essence and tries to lock women up in a "gender monoculture", as well as subjectivities and practices exceeding the dual system (Poidimani 2006). Or they can perform forms of resistance and seek to redefine the dominant gender model, thus contributing to its demise.

In what follows, four different gender identity positionings will be illustrated with the narratives provided by the knowledge workers on temporary contracts whom I interviewed. They range from the discursive construction of a traditional and stereotyped gender identity, to its questioning through narrative practices able to reconfigure both the traditional model of work and the social construction of gender that subtends it.

a. *Traditional gender positioning*

The first type of positioning identified in the interviews analysed relates to the predominant gender model, that of the male breadwinner; a model which takes it for granted that the man's role in the family is to deal with economic matters, while the woman's income, when there is one, is considered merely as support. This type of positioning is performed with no particular differences between men and women, who cooperate in the construction of a traditional gender model.

"For instance, a major concern that has always worried me is being unable to support my family, which I don't actually have, precisely because it has always worried me, this thing. That is to say, as time goes by I admire my father more and more – my mother is a housewife – so how the hell did he manage it? Four children and I feel so stressed to find myself in a situation that won't actually happen at this point, as either I marry a 20-year-old girl, since I'm already 38. I mean, if I marry someone who is 38 years old, surely not 4 kids, because if I have one, that's already luck, isn't it? Honestly, we've got to face reality. But I've always been worried about being unable to support a family" [M, 38²].

"It's obvious that this type of contract... luckily I'm a married woman, I have a husband I can count on, so there's already an income in the family. Clearly, if this is about the family's breadwinner, things are a bit more complicated, for in my opinion he must have a secure income. Once again, in my opinion, this role, these contracts, for a married woman, who anyway has other goals in life, are fine, otherwise it's a bit dangerous" [W, 39].

By stating that a man must provide for his family, these interviewees constructed their own identities, as well as those of their partners (real or hypothetical), thus complying with the traditional social attribution of gender. This follows a cultural model legitimating the role of the man as having a stable job with a secure income. In the narratives that reproduced this type of gender construction, men felt the obligation to have a job that guaranteed the family's well-being, as their fathers – usually presented as a model to emulate – had done before them. Women, instead, accepted their work instability, for there was a "husband to count on". Thus a prevailing symbolic order of gender emerges here which assumes that women behave in a feminine way and men in a masculine one (Martin 1990). That is, women are supposed to be involved mainly in the private sphere and in (unpaid) care-giving, while men work and deal with the public sphere. In this type of discursive positioning, therefore, non-standard work is translated, on the one hand, into an identity threat to men – for whom the figure of the "household head" is still the main model of masculinity – and on the other, into reaffirmation of a model of femininity which attributes women an ancillary role in the labour market based on a lack of real economic independence and almost exclusive involvement in unpaid work.

² The codes at the end of the interview excerpts stand for sex (W = woman and M = man) and the age of the interviewees.

b. *Inversion of traditional gender positioning*

Some of the stories recounted by interviewees comprised aspects relative to gender-identity positioning which specifically concerned men. These were stories which, in a certain sense, were the reverse of those described in the previous section in which it was the man who was depicted as the principal source of income. In these cases, by contrast, the discursive practices constructed a gender identity positioning in which women enjoy income security. The following excerpts comprise stories of men who have had the chance to fulfil their professional passions and have a family by virtue of the stability ensured by their partners' open-ended contract jobs.

"I got married in September 1992. I've had three children and in a way this has been a home experience characterised by this instability, although, well, my wife is a teacher – she works part-time, for family reasons – therefore at home there's always been certainty. This work path would have been impossible if my wife hadn't had a stable job from the beginning. Of course, if she'd had an unstable job as well, or if she hadn't had any job at all, something like this wouldn't have been feasible at all, I would have needed to find some other job" [M, 40].

"I have never considered seriously, except very briefly, the idea of switching careers. This has been understood, because, in order to keep doing this job, sorry to say, we had to make certain choices, hard choices unfortunately. My wife has found an open-ended job, and we've struck a balance in this sense. I've always received the greatest sympathy, and this has certainly been important. Even during certain crises I've always received encouragement" [M, 38].

In these cases, the women furnished work stability, while the men had unstable jobs, in an equilibrium which was nonetheless based on the male's involvement in the professional sphere and the female's disinvestment in work satisfaction in exchange for a more stable and protected position in the labour market, although one not corresponding to her aspirations.

The identity and gender positioning of these narratives differs from the previous ones in that I never found the same type of account – of support in pursuit of one's professional passions by a partner with a stable job – in the stories of the women that I interviewed. Whilst this seems to show a decline in the male breadwinner model, from the point of view of identity positioning, with regard to both work and gender it nevertheless reaffirms a masculine identity construct founded on fulfilment in paid work, regardless of the stability of the employment relationship. Moreover, numerous studies have reported that, in Italy, highly-qualified workers are willing to accept non-standard contracts if

this enables them to enter high-status jobs which match their qualifications (Fullin 2004; Bertolini 2005; Reyneri 2005), whereas those with lower qualifications regard income continuity and contractual stability as more important than the contents of the job (Bertolini et al. 2009).

c. *“Forced” destabilisation of the hegemonic gender positioning*

Whilst in the first two types of gender identity positionings the narrators welcomed and contributed to reproducing the prevailing gender order, in this section the gender construction that stems from the temporary workers’ narratives appears to overturn the traditional model, which is however immediately recomposed through various repair practices (Gherardi 1995). In this sense, it is an identity and gender role construction process characterised by greater heterogeneity and a closer intertwining of resistance and hegemony practices.

“The fact that I’m moving instead of my girlfriend is clearly a consequence of our work situation, in the sense that as my girlfriend has an open-ended job in a bank, I said ‘I’m not going to make her move’. If I’d had an open-ended job here in Trento, things would have been different. She would have come. Sure, that was a major point. One has to deal with reality” [M, 30].

“At home, we’re both forced to work, therefore there’s not enough time even to prepare and cook. Although I like cooking, I don’t have time to do it. He started to cook and to do something at home as well, because we’ve had a baby, and I can’t do everything on my own... But, pay this, pay that ... We are both forced to work, by necessity” [W, 45].

In these excerpts, the interviewees question, at least partially, the prevailing gender order that assumes that men are more involved in the public sphere and women in the private one. Yet, despite a higher degree of heterogeneity, these narratives stress that the conditions described have been an obligatory choice. By stating that “one has to deal with reality” or that “we are both forced to work”, the narrators enact discursive practices which put agency completely beyond their own responsibility, assigning objectivity to the situations that they experience, as though they have to justify a broken order. In this case, the narratives are mobilised not so much to describe the events experienced as to justify them and recompose them harmoniously, thereby producing a coherent sense of self (Bruner 1990). The interview excerpts describe, in fact, contingent resistance practices constructed in response to changes in the labour market, rather than to a cultural change in the social expectations tied to traditional gender roles. The latter therefore

persist in the background to these stories as options which would be taken if the work situation allowed it.

Hence, the identity positionings that emerge from the stories grouped in this category do not consist of a clean break with the traditional model, nor in the construction of biographies which rebel against the dominant pattern. Nevertheless, the work instability and precariousness experienced by the narrating subjects acquire sufficient force to disrupt the rules of the game. In fact, in both the interview excerpts, the temporary and insecure nature of work legitimates change with respect to the traditional type of gender positioning. On the other hand, although the male breadwinner model is transgressed, the identity of the narrating subjects is discursively recomposed, given that the respondents emphasise that they have accepted a model of work and gender which entails, in the first story, that the man should follow his partner in her change of job locations and, in the second, that both members of the couple should work, and that the woman should be less involved in (unpaid) work in the home.

d. *Resistance to the hegemonic gender positioning*

In the previous section I showed the identity positionings in narratives which disputed the dominant gender order through negotiations imposed by the instability of the employment relationship. In this section I shall instead describe some cases – even if they represent a small proportion of the total of interviews – in which the narrator seems to explicitly oppose the dominant gender order.

“It’s true that I don’t have a clock card and I am free to fetch my children, and one Tuesday in June to go to the park, but it’s also true that to be with them I know that after dinner I have to go back to work. That is, not having fixed hours is real slavery. I always have this sensation that I must keep going, keep plodding along. It’s a very unpleasant situation, and so is the uncertainty due to the fact that you don’t know when you should, when you can detach” [M, 40].

“Right now I feel fine because I’m single, but in the past I’ve had issues. People don’t understand that sometimes I work late, that a woman can work late. In the sense that sometimes some guys, some men find it odd that a woman could be an independent professional, in terms of commitment and organisation. And because it’s not a steady job, I can’t refuse, because you must be always available, but in any case it doesn’t bother me to work late, I like my job, I just don’t want to have my contract always expiring” [W, 33].

In the first account the narrator challenged the dominant organisational model by refusing to follow the practices of hegemonic

masculinity, and by engaging in practices of resistance in response to the lack of consideration given by the organisation to the need for reconciliation of work and personal life, and to the demands emerging from the family sphere. The employer organisation, in fact, does not grant knowledge workers with temporary jobs any right to a family life, from motherhood to spending time with their children.

The last excerpt instead exemplifies a particular type of identity positioning enacted by the majority of the single women that I interviewed in the public administration. These are stories in which the narrators position themselves in sharp contrast to the traditional gender model, but nevertheless encounter difficulties in constructing gender practices different from the traditional ones. In fact, the difficulty of positioning oneself within a couple if significant investment is made in one's work was mentioned by many of the women interviewees. As has already been stressed by other studies (e.g. Crespi 2005), for a number of young women the priority is to safeguard – alongside, or better on top of, work time and private time – time on their own when they can express themselves, their passions, their need for self-fulfilment (Leccardi 2007). This time devoted to themselves, although built around their work, represents a key change in identity construction which rejects one's story as "life for others" and claims "a life for oneself" (Beck-Gernsheim 2002) independently of any supporting function. Working thus becomes a means of emancipation. This was especially so for the women interviewees who gave it first place among their passions. And being single enabled them to focus on their career without upsetting their private lives.

6. Conclusions

The various forms of identity construction by knowledge workers on non-standard contracts therefore exhibit positionings which are highly diverse but nevertheless consist of narratives that are not gender-neutral. Every story, in fact, expresses a gender identity precisely because narrating also involves a positioning of the narrating self within the categorisations that the discursive and narrative practices of the reference culture make available, among which is the male/female dichotomy (Poggio 2004).

The excerpts presented above reveal a situation characterised – at different levels – by persisting dynamics of occupational segregation based on gender. These accounts represent, above all, different models

of identity construction and gender positioning pursued by subjects who experience situations of professional instability on a daily basis. By assuming a certain stance towards work instability, people present narratives that are not neutral to gender issues. In fact, all the narratives are recounted through the discursive practices available in the reference culture, and normatively or stereotypically associated with either sex. Some practices are conceived as being appropriate only to men, some others only to women (although available to both) (Gherardi 1995; Martin 2006).

The stories presented accordingly contribute to building and performing a particular type of masculinity and femininity. In the first two types of gender positioning identified by the interview analysis, the accounts of men and women jointly built a gender model that ascribed characteristics and diversities on the basis of the different sexes, keeping women subordinate to the role of men, who were allowed to make considerably larger investments in their work. Whilst the first type comprised accounts that fully acknowledged the prevailing gender order, even in the second type, in which there were cases of men with discontinuous incomes supported by partners with permanent jobs, what was disputed concerned economic stability, not traditional gender relationships. Although the proliferation of non-standard jobs has recast the forms taken by the division of labour, major gender differences still remain. Hence, increasing precariousness has reduced the differences between men and women, but it has done so downwards (Beck 1999), and it has created new and complex forms of inequality because women, who finally have the chance to work, must still deal with their work-related and private duties, especially amid the progressive crisis of the welfare state (McDowell 1991).

The other two types are characterised by (an apparent) destabilisation of the prevailing gender culture instead. In the first case, the dominant models were disputed, not for the purpose of reconfiguring gender relations, but as a reaction to precarious work conditions perceived as imposed. The second type comprised stories in which there emerged voices opposing the prevailing gender order. However, whilst on the one hand we can observe a process undermining the hegemonic dynamics, on the other, the narrators tell us about the difficulties involved in performing fragmentary work – as to when and where – in their private lives, and in their relationships with their partners.

The types of gender positioning presented in this chapter legitimate specific cultural models which define the gender characteristics

that people have, or should have, in order to be considered skilled members of a specific culture (Gherardi and Poggio 2003). Many of the stories collected lead the transformation of gender models back to contingent situations usually linked with structural and economic factors, rather than with the overturning of the cultural dimension within which gender stereotypes are rooted and dynamics of power between men and women are negotiated. And for those who eschew the prevailing gender scripts, it appears very difficult to propose different solutions without necessarily disinvesting in their careers and/or emotional lives, or without reproducing somewhat asymmetrical models.

A common thread across all four categories is an engaged response by knowledge workers that have engendered shifts in gender positionings and relationships. What remains to be seen, however, is whether the erosion of the standard model of work will continue to represent precariousness and work insecurity, tending towards a reinforcement of the traditional gender model, or whether the imposition of discontinuous employment relationships may give rise to new narrative plots of resistance against the monologue of the dominant gender culture.

Changes in knowledge work – and particularly in the gender and power relationships in which knowledge workers are involved – consequently has major implications for the gendered ways of knowing discussed by the contributions to this book. In fact, gender studies are concerned not only with the study of the relationships between women and men, but also with the social construction of gender and of the genderisation of knowledge itself. The case of knowledge workers highlights the inadequacy of the mind-body dualism, as well as what concerns the concepts of emotion vs. rationality and male vs. female. Persistent dichotomising and stereotyping ways of knowing can be seen, in fact, as a process of genderisation of knowledge. In this sense, how can reflections on gender, knowledge and the natural sciences and humanities contribute to the superseding of a binary vision of gender if knowledge workers – women and men – experience employment conditions which not only are increasingly precarious but also reinforce traditional gender stereotypes?

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Mainstreaming Gender in Research: Lessons from Europe

Teresa Rees

1. Introduction

The European Commission (EC) has recently conducted a thorough “stock-take” of its ten years of activities on the “wicked problem” of “women and science” (EC 2010). Prompted by concerns about global competition in research and development, and the wastage of the talents of highly trained women, as well as social justice arguments about equalities, the Commission has provided an effective leadership role in responding to this problem for more than a decade. In 1998, it set up a European Technology Assessment Network (ETAN) on women and science to identify key issues and make recommendations. Its report, *Science Policies in the European Union: Promoting Excellence through Mainstreaming Gender Equality* (Osborn et al. 2000) focused on the lack of reliable statistics; why so few women are recruited, retained and promoted in science; and the lack of transparency in processes of recruitment, promotion and appointment to senior decision-making bodies and committees. Crucially, how do those who decide what is “excellent” get selected? The report highlighted how men were disproportionately selected in every discipline, in every country and at every rank. Indeed, the academy in Europe could be described as medieval in many of its practices. The report then made proposals as to how the European Union, the member states, funding bodies and the universities, indeed the whole architecture of the academy can improve through modernisation. The report recommended gender mainstreaming throughout the academic infrastructure and in the research process.

Ten years on, we now have better statistics, which in turn reveal some progress in the numbers of women entering and developing successful careers in science. The Commission has built an infrastructure of

national representatives on women and science in the Helsinki Group. The Research Directorate-General coordinates networks of experts, convenes regular conferences, commissions and funds research and has published a series of reports on women and science. However, the key issues identified in the ETAN report still remain highly pertinent, after all this time and despite all these actions. Moreover, there is growing evidence that the failure to mainstream gender equality in the academy is highly damaging to the quality of research itself.

It is not simply the case, of course, that a better gender balance on funding bodies and in senior positions in universities and research institutes would mean that the gender dimension of research would always necessarily be addressed. But the absence of those voices denies research teams a wider range of experiences and perspectives.

In the US, Schiebinger has charted the shift in focus on women and science from “fixing” women as the “problem”, to “fixing the culture” of scientific and engineering institutions, to the current concern with “fixing the knowledge”, that is ensuring researchers benefit from the potential “gendered innovations” that can result from applying a gendered imagination to research (Schiebinger 2008; see also Schiebinger and Schraudner 2011). We can see parallels in developments in the European Union (EU). The 1980s were characterised by positive action projects, co-funded by the EC through Structural Funds, designed to lure girls and women into science and convince them that engineering was not just about oily rags. This could be described as a “blame the victim” or deficit model of understanding the issue.

More recently, there have certainly been some initiatives aimed at changing the “culture” of, for example, departments of chemistry and physics in universities in the UK, led by learned societies. The Royal Society of Chemistry commissioned research on the experiences of women in chemistry departments and found the culture of many to be unfriendly to women. The report argued the need to promote a culture which emphasises diversity “as a strength” (Royal Society of Chemistry 2002). Their later study found that the chemistry PhD programme and academic careers are modelled on “masculine ways of thinking and doing”; and that cultural “as well as procedural change is required to address this” (Lober Newsome 2008, p. 7). The UK Institute of Physics conducted visits to university departments to interview staff, examine statistics and discuss the extent to which the culture was “women friendly” (Institute of Physics 2006). It has since launched the Juno

project where well-performing departments are recognised as such. More widely, the Athena Swan project, funded by the UK Resource Centre for Women in Science and based in the Universities UK Equality Challenge Unit, recognises departments with bronze, silver and gold awards which have reflected on the role of gender in their cultures and have sought to recruit, retain and reward more women (www.athenaswan.org.uk). Athena Swan invites departments to examine their culture from the perspective of artefacts (such as portraits of Dead Great White Men in senior common rooms), values and assumptions, and publishes briefings and factsheets (for example Athena n.d.). However, while all these initiatives may prompt and reward self-reflection and action, no resource is provided for cultural change. This compares sharply with the US, where the National Science Foundation has allocated significant funds to support the ADVANCE programme, which provides Institutional Transformational Grants to Departments willing to explore and change their cultures (<http://www.portal.advance.vt.edu>).

As yet, in Europe, there is little progress on Schiebinger's third "fix", "fixing the knowledge". But awareness about the consequences of ignoring gender is growing as more and more academic papers drawing attention to the implications of this neglect are being published, especially in medicine (Greenspan et al. 2007; Holdcroft 2007; Holdcroft et al. 2011; Kernan et al. 2000; Wald and Wu 2010). Indeed, some products have had to be withdrawn from pharmacy shelves because women have shown contra-indications to products not tested on but nevertheless prescribed for them. Research funding bodies are paying increasing attention to this as a quality issue. Some funding bodies, especially in the US, are recognising this and insist that the gender dimension is addressed. Scandinavian countries have historically demonstrated the greatest commitment to gender mainstreaming in universities, and German state funding for research has guidelines on the issue, but new legislation in Spain is now potentially the most advanced in Europe in this regard. It stipulates *inter alia* that where appropriate, state funded research must address the gender dimension.

This chapter charts the progress on mainstreaming gender in research in Europe. It explores in particular the attempts by the EC to ensure that research funded through the Framework Programmes (FP) pays attention to the gender dimension. It draws on my experiences of being a Pro Vice Chancellor in a research-intensive UK university with responsibility for the research portfolio and as an expert adviser on gender mainstreaming to the Research Directorate-General, as well as

being responsible for a Gender Action Plan in an EC Framework Programme research project. By way of context, I begin by summarising the activities of the EC on women and science.

2. The European Commission and women and science

The ETAN report identified three objectives for the European Commission on women and science in 2000; they were used as a structure for the EC Research Directorate-General's "stock-take", which summarises its activities over the last ten years:

- “– Deepen the knowledge on the situation of women and science
- Increase the number and role of women in science, engineering and technology
- Mainstream gender in all other policies, especially research” (EC 2010, p. 9).

a. *Knowledge about women in science*

It is certainly the case that we know much more about women in science now than we did in 1998. In terms of statistics, for the ETAN report, the numbers of women professors in EU and in other countries had to be individually collected from each country and “equivalence” had to be established, given variations in status and nomenclature (Osborn et al. 2000). It was a major undertaking to collect the data to establish the number of women members of prize awarding committees and indeed prize winners of major international science awards, for the same report. Equally, for the EC's *Women in Industrial Research* report published a few years later (Rübsamen-Waigmann et al. 2003), there were challenges in establishing, for example, the number of female patent holders. Now the EC publishes *She Figures: Statistics and Indicators on Gender Equality in Science* on a regular basis (see for example EC 2009a for the most recent edition). Comparisons can be made across member states, over time, and by discipline. Moreover the Helsinki Group of national representatives of the member states and countries eligible to participate as partners in EC funded Framework Programme research projects regularly publishes data on the size and shape of the “scissors diagram” in each country, illustrating where the downward progress of women in scientific careers crosses over the upward trajectory of men (Rees 2002; EC 2008).

In addition to statistical benchmarking, the Helsinki Group has published the findings of its comparisons of national policies on women and science (Rees 2002; EC 2008). While clearly, not all policies are directly transferable, more knowledge on such approaches and their effectiveness enhances knowledge and understanding. Some member states have conducted their own reviews on women and science and published reports, such as France, the UK and Finland.

The EC's Research Directorate-General has commissioned and published a range of research reports on women in science in the public and the private sector, on women and science in the Central and Eastern European countries and the Balkan states, on women in decision-making about science, on building sustainable careers in the sciences, and on women and research funding, *inter alia*. All this has helped to map the territory and to facilitate a shared knowledge of the patterns of gender segregation, vertical, horizontal and contractual, of the science research labour market.

To ensure knowledge is disseminated, the EC has hosted a series of conferences and meetings of women in science and those responsible for educating and employing them, in both the public sector and in industrial research. Networks of women in scientific learned societies and chief executive officers of research and development companies have been brought together. Examples of best practice in employing women have been compiled and distributed. Altogether, over 30 reports of research and conference proceedings have been published.

While all this is welcome, it is clear that knowledge of the patterns of participation and analysis of some of the factors at work in generating those patterns is only the beginning. Understanding the data and implementing changes that might reduce the impact of gender in the academy is a long term agenda. In particular, getting beyond the obvious factors, such as work life balance, flexibility, stereotypes and assumptions to a more critical reading of the gendering of research and research institutions and indeed gendered ways of knowing, requires further work.

b. *Number and role of women in science*

According to the statistics now collected and regularly published by the Commission, the numbers of women in science, technology and engineering have certainly been increasing. Women are now a clear

majority of undergraduate students in the EU; indeed, in some countries they constitute over 60% of undergraduates; this level of imbalance is itself a cause for concern. Successive *She Figures* enable us to see that the female rate of growth per annum among PhD students is now over twice that of the male rate (6.8% compared with 3.2%, between 2002 and 2006) (EC 2009a, p. 39). However, gender remains a key organising principle in subject choice. While women now make up 45% of PhD holders in the EU 27 countries (2006), the figure drops to 41% for science, maths and computing and droops down to 25% for engineering, manufacturing and construction. Their numbers in research careers have also been growing at twice the male rate (4.8% compared with 2.0% per annum between 2002 and 2006), so that women now constitute just under one third of scientific researchers. They are more prevalent in government (39%) and higher education (37%) than in industry (19%), and are more likely to be found in the younger than the older age groups (all figures from EC 2009a).

The figures show that there is now a better gender balance among young scientists. However, it remains the case that there are relatively few women in senior, decision-making roles, among those who shape the science agenda. Just under a fifth of the Grade A professors (19%) are women in the EU and only 7.2% among those with chairs in Engineering and Technology (EC 2009a). There are very few women as heads of research institutions and only 22% as members of boards which organise research, for example through allocating research grants in the EU 27 (EC 2009a, p. 95). Hence there are still relatively few women determining what is “excellent” (Rees 2011), what should be the priorities for research, how institutions should be run and so on.

This imbalance at the senior decision-making level exists despite the fact that the European Commission committed itself to gender equality through its Mainstreaming Communication *Incorporating Equal Opportunities for Women and Men into all Community Policies and Activities* (EC 1996), and the Research Directorate-General set itself a target of 40% on all its scientific advisory committees in its own Mainstreaming Communication (EC 1999). This has been difficult to achieve, although progress had been made. While some expert groups, monitoring and evaluation panels have neared or reached the 40% target, this is certainly not the case for all programmes and groups (EC 2010, p. 201). In some cases, this is because it is dependent upon the member states to nominate sufficient women. However, in three of the member states, legislation requires a gender balance of at least 30% or 40% of both

genders on public bodies (EC 2009b). Scandinavian countries imposing a gender balance also have the highest proportion of women as heads of universities among member states (genSET 2010, p. 24; EC 2009a).

Norway imposes a gender quota not only on all public committees, including Research Councils, but also on public companies. A widely publicised report from McKinsey in the US suggests that women exhibit some leadership behaviours more frequently than men, and that this contributes to a stronger organisational performance; moreover, it reports on research that shows that “strong stock market growth among European companies is most likely to occur where there is a higher proportion of women in senior management teams” (McKinsey & Co. 2007). A report from the UK Government Department of Business, Industry and Skills (2011, p. 7) expresses concern and frustration at the slow progress of achieving a better gender balance on boards and cites Joy et al. (2007) who found that “Companies with more women on their boards were found to outperform their rivals with a 42% higher return in sales, 66% higher return on invested capital and 53% higher return on equity”.

Clearly, achieving a gender balance in the board room is good for the bottom line. McKinsey & Co. (2010) report that major blockages to women advancing to the top include lack of commitment from chief executives to the agenda, and lack of personal development opportunities for women. The crucial question for gender balance in research is whether the growing proportion of women among the early careers researchers will be reflected among the senior decision-makers and shapers of science of the future. Are scientific institutions adapting sufficiently to transparent, evidence based processes of selection and promotion? Are the employers of scientists and those who manage the funding, production and exploitation of scientific research aware of the gendered cultures of the academy and the consequent indirect forms of sex discrimination that they reproduce? Are the gatekeepers of science on their guard against unconscious bias? Is there leadership from the top and support for women in male dominated scientific cultures?

c. *Mainstreaming gender in policies*

The final objective set by the ETAN group was mainstreaming gender in all policies, in particular those relating to science. The commitment to this approach in the European Commission was strong, as witnessed

by the Mainstreaming Communications (EC 1996, 1999). However, it is clear that being a Commission policy, gender mainstreaming is not a concept that is easily defined and understood. It does not translate easily; the English term is often used. Different versions co-exist. It is a highly contested concept (see Rees 2007 for my interpretation; and the whole special issue of the journal for other reflections on gender mainstreaming). Despite the EU commitment and the developments in gender mainstreaming in Scandinavian countries that pursue this commitment, the implications of such an approach for policy are not always obvious to key actors in the EU charged with delivering it.

So, what do we mean by gender mainstreaming? I have argued that it turns the attention away from the individuals and their rights to “equal treatment” and from groups and the need to address their “disadvantages” through positive action measures to focusing attention on institutions and their policies, processes and procedures to understand their role in (however inadvertently) contributing to the gender patterns we can measure and observe (Rees 2007). Hence institutions need to reflect upon whether their procedures and policies are as “gender neutral” as they might imagine them to be. This involves using tools such as gender disaggregated statistics developed into equality indicators, gender proofing documents, conducting gender impact assessments of new policies. It means consulting rather than making decisions informed by assumptions based on gender stereotypes. In essence it means seeing the androcentricity that underpins so many organisations and their cultures and looking through a gender lens, so that gender does not have such an impact on decision-making. This “visioning” work is hard to do as we are all cultural products, but it is essential if we are to modernise institutions to be led by an evidence base rather than limiting stereotypical assumptions about women and men.

The approach of the EC to mainstreaming gender equality has been to develop internal structures, work with member states, develop work life balance legislation and mainstream gender through the Framework Programme (EC 2010, p. 147). The internal structure in the Research Directorate-General was a highly effective “Women and Science” unit, which was established to conduct the programme of work. However, in recent years, the name has changed several times and the size shrunk. Various expert groups and networks were established (EC 2010a). A European Institute for Gender Equality was eventually set up as a Technical Assistance Unit to the EC on gender mainstreaming for all Directorates, but it only began its work in 2010.

The arguments for gender mainstreaming in scientific communities made in the ETAN report have been picked up by the Helsinki Group, who have updated their review of national policies (EC 2008) and argue for “structural change” in their position paper *Gender and Research Beyond 2009* (Helsinki Group 2009). Currently a Communication is being drafted in the Education Directorate-General on modernising universities and in the Research Directorate-General on enhancing excellence, equality and efficiency in research, development and innovation – through mainstreaming gender in research. There is clearly wider support for the agenda of making European universities and research institutes fit for purpose in the context of global trends in research performance. The investment in countries such as China, South Korea, India and Brazil in developing scientists is already showing dividends in citation records and league tables. South Korea in particular, with its single-sex secondary schools for pupils that show an aptitude for science already makes the lack of girls in many science subjects in Europe look old-fashioned.

However, mainstreaming gender equality in scientific institutions to promote excellence among students and staff is not sufficient. There is also the issue of ensuring that attention is paid to the gender dimension in research itself. To what extent has the EC contributed to “gendered ways of knowing”?

3. Mainstreaming gender in European Commission research

It is arguably curious that the scientific endeavour, with its attention to minimising bias through careful research design of sampling, through control groups, and through experiments designed to ensure a constant range of variables to test the effects of others appears so often to ignore the significant impact that gender has on so many facets of life. Aside from the more obvious physical differences between the two sexes, the social construction of gender roles is a crucial variable in occupational life-chances, income, wealth, educational achievement, industry and sector worked in, hours worked, cause and age of death and so on. And yet much research, including medical, life-sciences, engineering and, among the social sciences, economics, often ignores the role of gender, thereby compromising its quality and indeed in cases its validity. Gender studies and women’s studies have documented and analysed the significance of the impact of gender but much of this scholarship is ignored by researchers in other major disciplines.

The ETAN report (Osborn et al. 2000) called upon the Commission to engage with this issue at a time when little attention had been paid to it by the scientific infrastructure in Europe. The Research Directorate-General created a growing space in successive Framework Programmes for research on this topic. Indeed, 15 million euro was allocated for research projects on women and science in the 6th Framework Programme (2001-2006) and 21.7 million euro in the 7th (2007-2013). But of more significance to the agenda of mainstreaming gender in research was the post-hoc review the Research Directorate-General commissioned of whether and how gender had been addressed in research projects funded under the 5th Framework Programme (1998-2001) (EC 2001; Klinge and Bosch 2001). The conclusions pointed to how in many cases, the research had ignored and could have been improved by incorporating a gender dimension. It was arguably the first major litmus test of gender awareness in the research community.

The Commission also convened a workshop in 2003 to kick-start a debate among research institutions and funding bodies on “Minimising gender bias in the definition and measurement of scientific excellence” (Brouns and Addis 2004). This included discussions of gender and peer review, citations, bibliometrics, publications, research assessment, selection committees and the research process itself, especially interdisciplinary research. The conclusions pointed to the need for further research, for training and awareness-raising, for a better gender balance in informal research networks and for more transparency in the assessment of research excellence (Brouns and Addis 2004). One space that has developed for further consideration of gender has been in the UK’s periodic “research assessment exercises” (RAEs), which determine the allocation of a significant part of research funding to universities. Versions of the RAE have now been emulated in some other countries, such as Ireland, Australia and New Zealand. Institutions are judged on measures such as the quality of the four best publications of their staff, research income, numbers of postgraduate students and research environment. Growing attention has been paid in successive RAEs to equality and diversity issues in terms of the participation of women as assessors and recognising special circumstances that might affect the productivity of individuals, but no attention has been paid to assessing the extent to which the quality of research being assessed may be impaired through ignoring the gender dimension (Higher Education Funding Council for England 2009; Equality Challenge Unit 2009). The 2014 “Research Assessment Framework” being planned in the UK has

the most developed guidelines on equality and diversity to encourage for example, appropriate participation of women in making the assessments, and accordance being taken of working part time, for example, but it still remains silent on assessing the quality of research (or its “impact” – a new assessment focus) in terms of the extent to which it takes account of gender.

Following on from the post hoc “gender impact assessment” of the extent to which gender had been taken account of in the 5th Framework Programme, the Research Directorate-General took a more pro-active stance in the 6th Framework Programme by insisting that research applicants prepared a “Gender Action Plan” as part of their proposals. As the EC “stock-take” on women and science reports (EC 2010), the objectives of these plans were to:

“... increase women’s (or men’s, where men were in a strong minority) participation within the research workforce, especially at decision-making level; to allow a better understanding of the gender dimension in research, especially for the definition and the evaluation of scientific excellence; to raise the gender awareness of different categories of actors, within and outside the European Commission, involved in the design, the evaluation, the selection, the negotiation, the realisation, the implementation and the follow-up of research projects; to highlight the respective responsibility of each actor regarding the EU commitment to ensure gender equality and to implement gender mainstreaming in all its policies and programmes, including Research policy and the Framework Programme” (EC 2010, pp. 178-9).

In essence, then, the Gender Action Plans sought both to improve the gender balance among the research teams supported through the Framework Programmes, and to encourage addressing the gender dimension of research.

a. *Gender balance in research teams*

As we have seen, the commitment made by the European Commission to improving the gender balance among its own scientific advisory committees has proved difficult to deliver on, despite setting targets of 40% following the Mainstreaming Communication. The stipulation in the guidelines for the Framework Programmes sought to ensure a better gender balance among those teams supported for their research. While this is partly a matter of social justice, it is also the case that there is growing evidence that teams comprising of men and women produce better work. Indeed the genSET report on the gender dimension in

research, which was agreed upon by science leaders in Europe (genSET 2010), cites a range of studies (for example, Barjak and Robinson 2008; van den Brink 2009) to report that mixed teams “are also more creative, contain more diverse points of view and show an improved quality of decision making” (genSET 2010, p. 16). Equally, Bear and Woolley report on research studies that show how scientific discoveries are increasingly the outcome of team work, and that teams with greater numbers of women “improve group processes, which, in turn, facilitate increased collective intelligence” (2011, p. 151).

Unfortunately, it proved impossible for the Research Directorate-General to monitor the gender balance of research teams supported by the Framework Programmes effectively (EC 2010, p. 179), so it is not possible to evaluate the impact of this strategy for achieving a better gender balance in research teams.

b. *Gender action plans in research*

In the 6th Framework Programme, the Commission guidelines insisted that each Integrated Project and Network of Excellence (the larger research investments) proposal should include a Gender Action Plan that would include details on how the gender dimension would be incorporated into the design, conduct and delivery of the research project. A section in the application form had to be completed on this. This was challenging for many research teams, including those whose topic did not necessarily or obviously have a gender dimension and for those for whom this was relevant but a new and challenging requirement.

The EC’s stock-take found that the quality of the Gender Action Plans was “variable” and that only an estimated 15-25% of those analysed “were regarded as very good or excellent” (EC 2010, p. 181). So, while the exercise will certainly have raised awareness of how important the EC felt the gender dimension of research to be, the impact on raising the quality of research through this stipulation is thought to have been limited. The lack of awareness of the issue was again identified as a key weakness (EC 2010, p. 186). So much so, that this requirement for Gender Action Plans was dropped for the 7th Framework Programme (2007-2013), although the target of 40% female participation remained. Rather than insisting that applicants spell out how they intended to integrate gender into the research design, the guidance notes simply stipulated that: “Wherever human beings are involved in the research, for example as consumers, users and patients, or in trials, gender will

be an issue and should be considered and addressed" (EC 2009c, cited in EC 2009d, section 1.5).

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In order to address this key problem of lack of awareness, the Research Directorate-General then commissioned three organisations, Yellow Window Management Consultants, Engender and Gender at Work, to develop a toolkit on gender in research (see EC 2009d) and to provide free training courses to researchers in institutions across the EU who might be considering making applications for 7th Framework Programme projects. The toolkit is a useful source of examples and promotes creative thinking about gender in research projects (<http://www.yellowwindow.be/genderinresearch>). However, the relatively modest investment of resource in these organisations to develop it and to deliver the training arguably meant that they could only begin to touch the surface in addressing the gap in knowledge and awareness in the research community. The significance of the raising awareness agenda in the US, however, is evidenced by the decision by Harvard University to introduce the Implicit Project, which enables researchers to understand how implicit sex stereotypes can influence decisions about science and technology.

When the guidelines for the 6th Framework Programme were published and putative applicants noticed the stipulation that there should be a clear indication of the gender of the team members and that the project should include a Gender Action Plan, many female gender experts of my acquaintance, and I, received invitations to join a team of researchers putting together a proposal. On more than one occasion it was explained that having a female gender expert on board would assist in fulfilling both requirements. Inevitably, in some cases this meant that the gender expert joined the team late, after the research design of the project had largely been decided upon. This meant that mainstreaming a gender dimension into the project was already problematic.

I was invited to join a team of 23 researchers who were elaborating a bid for an Integrated Research Project, EURODITE, on Regional Trajectories to a Knowledge Economy, but only in time to attend the last meeting before submission. It is challenging at that stage to avoid the trap of the Gender Action Plan being seen as the sole responsibility of the gender expert, rather than a team effort, where members draw upon the expertise of a gender specialist.

For many of the international and interdisciplinary members of the EURODITE team, implementing a gender dimension into the data

collection for case studies was a normal and natural course of action but for others it seemed less relevant and there was a danger, as in other projects, of the gender experts becoming regarded as the “political correctness police”. Nevertheless, by paying attention to the gender dimension in data gathering, significant insights were made into the gendering of the knowledge economy that would otherwise have been missed (see Parken and Rees 2011). The lessons from this and others’ experience is that there are significant variations among researchers from different disciplines, countries and of different ages in terms of the extent to which gender is identified as an important variable. Integrating more gender awareness in the undergraduate curriculum and in the training of postgraduates is an urgent agenda item in order to improve the extent to which the gender dimension is integrated into research in Europe. Equally, funding bodies insisting on paying attention to the issue can prompt action, even if the evaluation of the outcomes of the Gender Action Plans by the Research Directorate-General suggest it is an agenda on which the research community is not yet equipped to deliver.

4. Conclusions

A growing body of evidence demonstrates how important it is to recognise the gender dimension in research. Indeed, Schiebinger (2008) has pointed out that one of the consequences of failing to pay attention to gender is that women die. The critical issue is that females are usually omitted from clinical trials in case of pregnancy and because of the potential impact of hormones on the trials, but any pharmaceutical products that result from the research are still prescribed to women (Holdcroft et al. 2011). As the United States General Accounting Office (2001) reported, most withdrawn drugs had greater health risks for women. As Buitendijk et al. (2011, p. 811) argue, “medicine as it is currently applied to women is less evidence-based than that being applied to men”.

Studies on the link between taking aspirin and heart disease and strokes were predominantly male-only trials, but more recently there have been papers published reporting that aspirin may act differently in the two sexes. Researchers have argued a cogent case for paying attention to the gender dimension in studies of pain and analgesia (Greenspan et al. 2007; Holdcroft 2007; Holdcroft et al. 2011). The EC guidelines quoted above give guidance on the necessity to include men and women in studies involving, *inter alia*, clinical trials (EC 2009c, cited

in EC 2009d, section 1.5). However, they did not mention research on animals, despite the fact that there is evidence that male rats and mice, for example, are used much more frequently than female ones (Wald and Wu 2010; Zucker and Beery 2010).

However, the neglect of the gender dimension is not just an issue for medical research. Numerous studies and guides are drawing attention to the androcentricity of much research and the implications of this for policy – in engineering, sustainability, transport, planning and so on (Schiebinger 2007; Schiebinger and Schraudner 2011; EC 2009d). Of course, good research should not simply pay attention to gender; it should be incorporating all variables that may be significant to the project. These may include the other “protected characteristics” identified in the Amsterdam Treaty: age, ethnic origin, disability, faith and belief, and sexual orientation. The US Journal of the National Cancer Institute already stipulates that as a “commitment to sound, scientific research”, authors of papers based on clinical and epidemiological studies should see if there is an effect not just of sex but of ethnicity, and specify this in the results in either case.

It is clear that there is growing recognition of the need to address the dimension of gender in research. There are examples of both American and European research funding bodies that are now stipulating that gender aspects of research should be considered; it is a criterion in the evaluation (see Holdcroft et al. 2011; Rees 2011). Equally, some publishers of academic journals are specifying that contributors should indicate the number of men and women among subjects of studies (see Buitendijk et al. 2011, which encourages “The Lancet” to make such a requirement). The Spanish Government has passed legislation to promote the inclusion of gender in research, and to promote a better gender balance of researchers in funded projects. This radical approach also addresses the need to integrate awareness of the gender dimension into the undergraduate curriculum and for research organisations to develop gender action plans. A group of senior research leaders in Europe have signed a document listing recommendations for organisations to improve the position of women in science as a profession and as an activity (genSET 2010). The European Commission is currently exploring possibilities for “Structural Change” in research, development and innovation in the EU in order to promote excellence in science: this is again focused on the twin agenda of improving the gender balance among the research community but also improving the quality of science by addressing the gender dimension (EC 2011). The EC is concerned

by the global competitive position of science in Europe compared with other parts of the world.

There are in short a number of lessons from Europe on mainstreaming gender in research. To promote excellence in research, it is essential that researchers are encouraged and equipped to address its gender dimension. More women in decision-making roles would bring a wider range of experiences and perspectives to the funding, conducting and evaluating of research (this is not a biological essentialist argument). The EC has certainly demonstrated an awareness of the significance of the agenda, but its measures have not as yet been very effective. This is largely because researchers themselves have not seen the relevance of the gender dimension. The academic community needs to police itself, through its journals, funding bodies and learned societies and to mainstream gender into the curriculum that is used to train the next generation of researchers. "Gendered ways of knowing" can be learnt, to the benefit of all.

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Thoughts after Gendered Ways of Knowing

Stefanie Knauss

The conference out of which the present volume developed was motivated by the particular context in which it was situated: the Fondazione Bruno Kessler, a Northern-Italian institution where research on a wide range of topics is conducted, from material studies and information technology to religious and historical studies. The encounter of these rather diverse disciplines provoked the question of how gender as a concept plays a role (or not) for these disciplines in their respective research, and in which ways. This fundamental question about the relation of gender and knowledge branches out in different, separate but interrelated topics, as the contributions to this volume show: what does the gender distribution among the researchers in a particular discipline look like: is there a predominance of male or female researchers, has this changed over the years, and why is this so? How does the gender of the researchers impact on how research is conducted (the “culture” of a given discipline)? Are the disciplines themselves, their methods and approaches “gendered” through associations with stereotypically masculine or feminine characteristics, such as rational, objective, empirical vs. experiential, subjective, hermeneutical approaches and the knowledge they produce? How did and does scientific knowledge, technology, but also statistical classifications or models of work, contribute to the construction of certain ideas of stable categories of masculine and feminine gender which are then ascribed to persons, fixing them in a predefined gender identity? And how did gender studies themselves contribute to the stabilisation of gender differences? How does scientific knowledge reflect in individual self-perception and social relations? How do the socio-cultural context of research and particular political interests intersect with the construction of gender, or, in other words, what happens when the Western concepts of gender and of knowledge is transferred to other contexts?

These and other questions are taken up and discussed in the contributions to this volume, which in their broad range of perspec-

tives (from history to sociology to postcolonial studies to philosophy to neurosciences etc.) reflect the need to approach the topic from many different angles, and the host of issues related to it, without even beginning to exhaust it. As readers will have noticed at this point, these different perspectives are necessary to show both the scope and the limitations of the issue under discussion.

In these reflections, I will not react to each paper individually, although each provides important insights and raises questions worthwhile a further follow-up. I will rather, from my perspective as a humanities scholar, briefly discuss some issues that appear in some of the papers that are controversial or that could be stimulating for future research.

For many people the difference between men and women appears as one of the most obvious and basic facts of life, simply reproduced and described in ever more detailed ways with the help of intricate scientific methodologies and technologies. Yet the papers in this volume (in particular those by Stefan Hirschauer, Theresa Wobbe, Catherine Vidal and Marlen Bidwell-Steiner) show that sciences do not simply look at the world as it is, but observe this world with the help of distinct schemata of interpretation. By doing this, they create a world and generate differences through their particular systems of classification, among them the gender binary that thus becomes naturalised as a set of categories (female/male) to which each individual has to comply – categories that are easily taken for granted and applied not only to the human realm, but used as a system of imposing order on the world in the diversity of its phenomena. Natural sciences in particular, but also other disciplines of research, have contributed to the ontologisation of gender, fixing it in particular body parts and, even more subtly, substances such as germ cells, the hormonal cocktail in the blood or even more ephemerally, in neuronal activities whose presence and functioning then become determining for an individual's identity, reducing their personhood to neuronal activities or germ cells, as Vidal critically points out.

And not only natural sciences contribute to this process: Wobbe lucidly shows how social sciences equally establish contingent categories through their statistics, such as the concept of gainful work and principal occupation, which excludes other types of work such as housework as unproductive and thus initiates the gendering of the sphere of work outside of the home and in the home (masculine respectively feminine), creating a presumed reality of models of work according to which individuals understand themselves as being included or excluded

from certain spheres of life as a consequence of their gender. The case of work is particularly interesting because it shows how people are “made up” (Hacking) in a way that acquires an enormous power of classification: around 1900 women are no longer welcome as factory workers but are limited to housework, their “appropriate”, not to say “natural” sphere of life, while men become the prototype of the productive worker and as such subjects of the public sphere. Echoes of this model of the productive male worker are still functional today, as Annalisa Murgia’s study shows: men who work in atypical (i.e. unstable, flexible, temporary, home-based) jobs perceive a conflict between their “feminine” job and their masculine identity. Attempts to resolve this conflict refer persistently to traditional conceptions of gendered work reconfirming the traditional model of the male breadwinner and the “right” of men to greater investments in and satisfaction derived from their work. Murgia’s study is a telling example of how pervasive established categories of gender difference are in all spheres of life and how difficult it is to resist to them.

Gender studies themselves have participated in this construction and reaffirmation of a system of gendered differences with their insistence on masculinity and femininity as independent variables: if it is important to differentiate between men’s and women’s experience of, for example, illness, work life or legal representation (as it is, without a doubt), then, vice versa, this attention to a masculine-feminine difference uncannily contributes to the consolidation of the perception of an inevitability of these differences. Not least, if gender studies as a discipline of research want to survive they have to insist on the existence of a binary (or plural – it makes no difference) system of categorisation of people and, consequently, of social relations, objects and the world as a whole. This is not to say that gender studies or their methodologies are wrong or unnecessary, because, in this imperfect world, differences in the roles of and relations between men and women exist and they are in their consequences rarely “equal” differences but instead come with hierarchies, oppression, discrimination and worse, but it is important to remind the “expert discipline” of its need for critical self-reflection about when and through which mechanisms it contributes to the solidification of a particular gender system rather than questioning it again and again. Barbara Duden’s reflection on the transformation of the meaning and use of the term “gender” and its (unwitting?) implication in political discourses is therefore an important contribution that raises many more questions on the entanglement of gender and politics.

This becomes also clear in Winkel's study of the encounter between Arab-Islamic systems of gender knowledge and Western ideas about gender relations that shows how the export of a Western concept of gender (and of other concepts) can dissimulate indigenous gender knowledge and systems of gender relations, with the effect of colonising these cultures also through the use of "gender" as a Western category. Instead, as gender studies themselves occasionally tend to forget, "gender" is not a universal term, but there exist "multiple genders", as Winkel calls them, multiple systems of imagining and understanding gender identity and gender relations.

This plurality is multiplied by the fact that not only are there multiple concepts of gender, but also multiple forms of knowledge: Sandra Harding underlines how religious, experiential or embodied knowledge – often the main form of knowledge in non-Western societies – is not accepted as "real", scientifically reliable knowledge by Western science studies so that these cultures of knowing are "colonised" through the predominant, globalised Western view of knowledge and science; in the Western academic context itself, such forms of knowledge are not accepted as "valid". The triangulation of gender studies, science studies and postcolonial studies that Harding calls for is an important complication of the question of gender and knowledge, and the contextuality and situatedness of gender and knowledge has to be taken into account in order to avoid implicitly universalising tendencies. Harding herself suggests standpoint theory as a method to promote marginal and excluded perspectives, while M. Cristina Amoretti and Nicla Vassallo propose a "democratisation" of knowledge making instead, i.e., an organisation of knowledge that allows for a pluralisation of perspectives of equal status, without privileging one or the other in order to ensure the upmost objectivity, based not on a single, absolutised perspective, but rather derived from the mutual corrections between many different viewpoints.

The awareness for the multiplication of the concepts of gender and knowledge through the intersection of other relevant factors such as race, class, sexuality, age, abilities etc. is an important challenge for gender studies and science studies with their respective truth claims. Yet this also raises the question how these multiple perspectives can be managed and evaluated as equal in the "real" world of knowledge production and dissemination with its various political interests that are not always exactly favourable towards the democratic inclusion of "minority" knowledges (neither regarding their methodology nor the results derived from it). And in how far can results of studies of very

specific contexts become productive and relevant on a larger scale? Is there not the danger that research that takes seriously the particularity of each context become a soliloquy of interest only in this given situation? How can it contribute to other contexts where similar questions are posed? How is it methodologically possible to negotiate the attention to the particular with an interest in wider transformative tendencies?

Various forms of knowledge thus contribute to the gendering of persons in their different ways, through the construction and consolidation of a binary gender system with its associated social roles, stereotypes and power relations that are taken for granted by individuals and prove hard to resist or to change. Indeed, attempts at dissolving gendered differences in the academic sphere through gender mainstreaming on various levels, as it is promoted by European and national policies as Teresa Rees describes them in her paper, meet strong resistance up to the point that their requirements are toned down rather than insisted upon, although most experts agree on the fact that awareness of gender as a category contributes to the quality of research. In fact, faced with the freedom to define one's gender (nearly) as one wishes, legitimated through theories of its social constructedness and performativity, people seem to rely ever more willingly on the certainties suggested by scientific constructions of gender difference, as the immense popularity of books of the type *Men are from Mars ...* suggests. How does this relate to Duden's observation of the inflational use of the term "gender" in all sorts of discourses together with the popularisation of the theory of its social constructedness? Are seminars where to learn gender awareness and how to perform gender simply the other side of the coin? This raises intriguing questions about a possible interaction of multiple processes of stabilisation and destabilisation of the concept of gender in science and society.

While the processes through which sciences construct gendered difference are being analysed in critical science studies (as the papers collected here show), the processes of how their contingent results develop their formative, naturalising power in individuals and societies, the factors that favour this passage from scientific knowledge to lived reality, the symbolic power of gender difference, and the multiplicity of popular gender discourses call for closer critical attention. Vidal's study of how media report on neuroscientific studies on gendered brain differences is one step into this direction, as well as Bidwell-Steiner's analysis of how misogynist views of women have been consolidated throughout history in spite of changing scientific paradigms. It appears

that situations of social unrest and insecurity favour a consolidation of a clear gendered hierarchy with women inferior to men, an insight that is also applicable to the current need for stable gender categories in today's situation of postmodern dissolution of certainties and values; this intuition requires certainly confirmation in further critical studies of other historical and cultural contexts.

Gendered ways of knowing thus open up a wide scope of possibilities, questions and perspectives, but they still include certain limitations. From my humanist's viewpoint, it does not always appear productive to think about gendered differences in the ways of encountering the world and knowing about it, since this might actually reaffirm stereotypes about women's and men's intellectual capacities. Instead, the acknowledgement of different ways of knowing – rational, empirical, experiential, hermeneutical, embodied, religious, scientific etc. – and their different, but possibly complementary ways of enquiring about the phenomena of this world, and the inclusion of intersections of gender with other factors in the analysis are fundamental for the questioning categories of classification, the analysis of their origins and persistent validity. The papers collected here do not only discuss gendered ways of knowing, but they also show the gendering ways of the knowledge of different disciplines and sciences, how they create gender categories and attribute them to persons and objects of the world, thus contributing to the stabilisation of a difference that is indeed unstable. It is important to treat gender as a question rather than as the answer (thus Joan Scott in *Unanswered Questions*, quoted in Wobbe's paper), as an unstable, changing, multiple category rather than a fixed framework in which to sort the world. Thus understood, gender can again become a useful concept of analysis in diverse socio-cultural contexts. The contributions to this volume unquestionably show that this contingency of the concept and the entailed uncertainties are not disabling for critical research, but instead stimulate and inspire it.

Notes on Contributors and Editors

Maria Cristina Amoretti is currently post-doctoral fellow at the University of Genova (Italy). Her primary research interests are in the fields of epistemology and the philosophy of mind and science. She wrote *Il triangolo dell'interpretazione* (2008), *La mente fuori dal corpo* (2011), co-authored *Piccolo trattato di epistemologia* (2010), edited *Natura umana, natura artificiale* (2009), and co-edited *Conoscenza e verità* (2007), *Knowledge, Language, and Interpretation: On the Philosophy of Donald Davidson* (2008), and *Triangulation: From an Epistemological Point of View* (2011).

Marlen Bidwell-Steiner holds an Elise-Richter grant by the Austrian Science Fund (V148-G15) to accomplish her habilitation project *Persistent Corporeality: Early Modern Natural Philosophy Meets Postmodern Gender Theory* at the Department of Romance Studies at the University of Vienna. She is editor of the book series *gendered subjects* and was head of the Gender Research Office at the University of Vienna. Her main scholarly interests comprise body concepts in Early Modern natural philosophy, gender theory, metaphor theory and narratology.

Giovanna Covi teaches Anglo-American literature, gender studies and critical theory and is board member of the *Centro Studi Interdisciplinari di Genere* at the University of Trento; she has been group coordinator in the European research network Athena 2 and 3 and is active in AtGender. Her research on US and Caribbean literatures is focused on issues of gender, race and citizenship. Among her most recent publications: *Jamaica Kincaid's Prismatic Subjects: Making Sense of Being in the World* (London 2003), *Modernist Women Race Nation* (London 2005), *Caribbean-Scottish Relations* (London 2007), *Interculturality and Gender* (London 2009) and *La Dividua – A Gendered Figuration for a Planetary Humanism* (in Morgan and Karavanta 2009).

Barbara Duden is a historian and has studied the disembodying effects of medicine's interventions on women since the 1980s, basing her position on the study of women's haptic sense perception in the early 18th century. Among others she wrote: *Die akademische Dekonstruktion der Frau: Judith Butler*. In: Barbara Duden (2002): *Die Gene im Kopf – der Fötus im Bauch. Historisches zum Frauenkörper*. Hannover: Offizin, 200-214.

Sandra Harding is a professor of education and women's studies at the University of California, Los Angeles. She is a philosopher, and the author or editor of 16 books and special issues of journals. She directed the Center for the Study of Women at UCLA 1996-2000, and co-edited *Signs: Journal of Women in Culture and Society* 2000-2005. Recent publications include *The Postcolonial Science and Technology Studies Reader* (Duke University Press 2011), *Sciences From Below: Feminisms, Postcolonialities, and Epistemologies* (Duke 2008), and *The Feminist Standpoint Theory Reader* (Routledge 2004).

Stefan Hirschauer, professor of social theory and gender studies at the University of Mainz (Germany). PhD (1991) and *Habilitation* (1998) in sociology at the University of Bielefeld. 1990-1999 managing editor of the *Zeitschrift für Soziologie*. Guest-professorships at the Centre de Sociologie de l'Innovation (Paris), the University of Vienna and Cornell University. 2002-2006 Professor for sociology and Gender Studies at the LMU Munich. Research interests: theories of practice, analytical ethnography, sociologies of knowledge, the body and of gender differentiation.

Stefanie Knauss studied theology and English in Germany, Austria and the UK. After her PhD in theology she worked as a research fellow in the Fondazione Bruno Kessler, Trento (Italy) and is now affiliated with Köln University and Humboldt-University Berlin as a visiting scholar. In her research she focuses on the role of the body in religions, gender studies and queer theory in theology and the interaction between media and theology. Recent publications: *La saggia inquietudine: il corpo nell'ebraismo, nel cristianesimo e nell'islam* (2011); with A. Ornella (eds.): *Fascinatingly Disturbing: Interdisciplinary Perspectives on Michael Haneke's cinema* (2010).

Annalisa Murgia is a member of the *Centro Studi Interdisciplinari di Genere* (CSG) at the University of Trento (Italy), where she is lecturer for the Master in Gender Policies in the Labour World. Her researches focus on work trajectories, with special regard to workers with non standard and precarious jobs, and on the social construction of gender in professional careers.

Teresa Rees CBE AcSS BA PhD FRSA is a professor in the School of Social Sciences, Cardiff University, where she has recently completed a six year term as Pro Vice Chancellor. She is also the director for Wales of the Leadership Foundation for Higher Education. Her research has focused on gender mainstreaming, which involves embedding a gender dimension into the policies, processes, systems and structures of organisations. She has acted as a long term expert adviser to the Research Directorate-General of the European Commission, in particular on women and science policy in Europe.

Nicla Vassallo is full professor of theoretical philosophy at the University of Genova (Italy). Her primary research and teaching areas are philosophy of knowledge and epistemology. She also has serious research interests in feminist philosophies, gender studies, history and philosophy of logic, metaphysics, philosophical naturalism and scepticism. Her latest monograph is *Per sentito dire. Conoscenza e testimonianza* (Feltrinelli 2011) and her latest co-authored work is *Piccolo trattato di epistemologia* (Codice 2010). Her most recently edited book is *Donna m'apparve* (Codice 2009), her most recently co-edited book is *Terza cultura* (il Saggiatore 2011). She regularly contributes to the cultural pages of various magazines and newspapers.

Catherine Vidal is a neurobiologist and Research Director at the Institut Pasteur in Paris. Her current research relates to the neuropathology of Creutzfeld-Jacob and prion diseases. Besides her fundamental research, Catherine Vidal is involved in popularising science through publications, conferences and intervening in the media. She is interested in the relationships between science and society, particularly concerning biological determinism, brain and gender. She is a member of 'Women and Science' committees at CNRS and Institut Emilie du Châtelet. She was promoted *Chevalière de la Légion d'Honneur* in 2009.

Heidemarie Winkel, PD Dr., was assistant professor at the University of Potsdam (Germany) until 2011, and is now acting as a private senior lecturer (*Privatdozentin*) at the same university. She is a sociologist, specialised in sociological theory, qualitative methods and works on gender and religion as thematic core areas. She spent 2.5 years in the Middle East and devoted her professorial thesis to the sociology of Arab societies. Central focus is the shifting of gender relations against the background of religious legacies and cultural structures.

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Theresa Wobbe, Dr. phil., historian and sociologist, is a professor of sociology of gender at the University of Potsdam (Germany). Her research focuses on shifting gender concepts in a national, European and global perspective as well as on kinds of categorisation and statistical classification from the perspective of a sociology of knowledge. Recent publications include (ed. with Isabelle Berrebi-Hoffmann, Michel Lallement) *Die gesellschaftliche Verortung des Geschlechts. Diskurse der Differenz in der deutschen und französischen Soziologie um 1900* (Frankfurt a.M./New York: Campus 2011); *Making up people: Berufsstatistische Klassifikation, geschlechtliche Kategorisierung und wirtschaftliche Inklusion um 1900 in Deutschland*, in "Zeitschrift für Soziologie", 1 (2012).

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